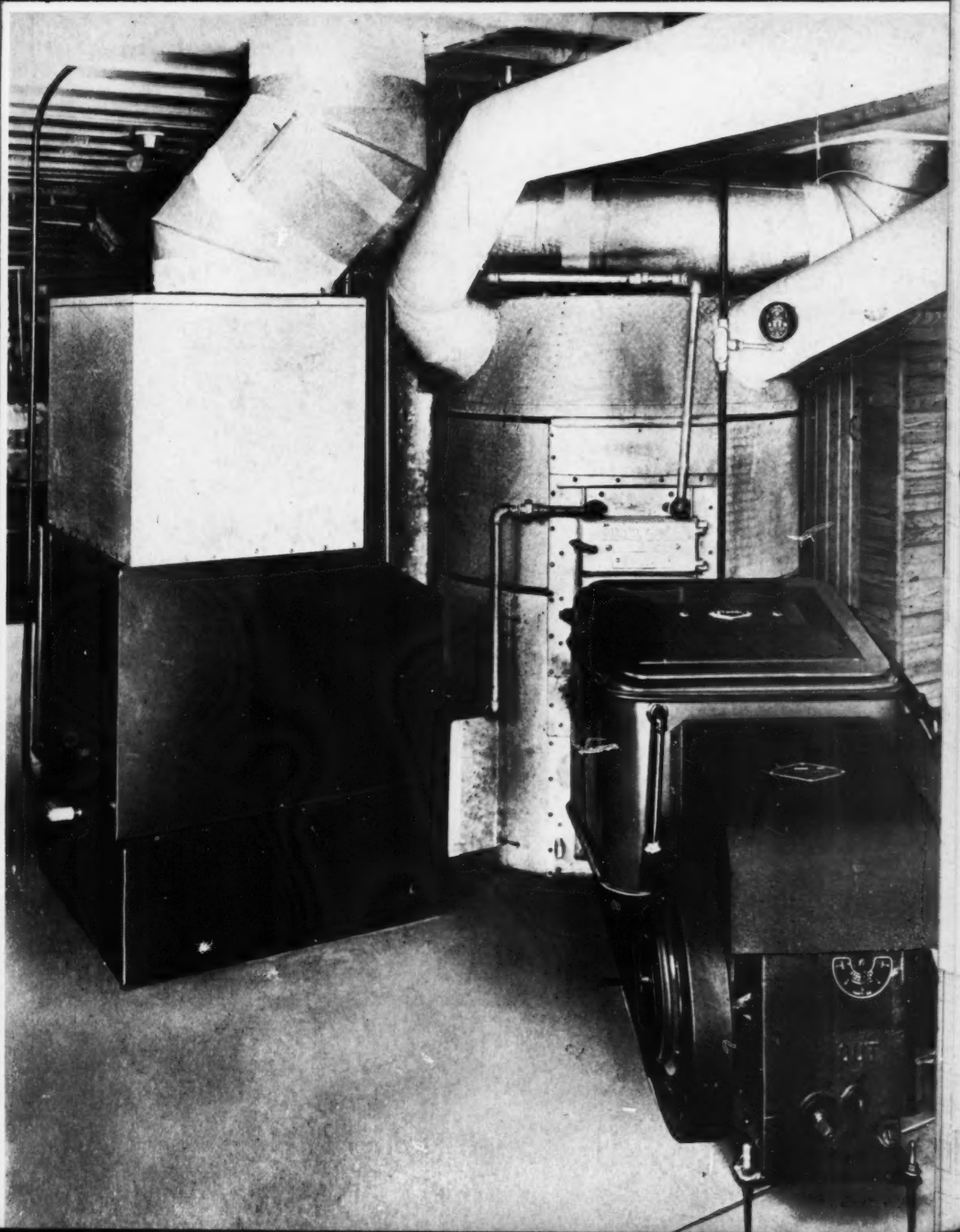


AMERICAN ARTISAN

WARM AIR HEATING • AIR CONDITIONING
SHEET METAL CONTRACTING

AIR
CONDITIONING
SECTION

PAGE 35

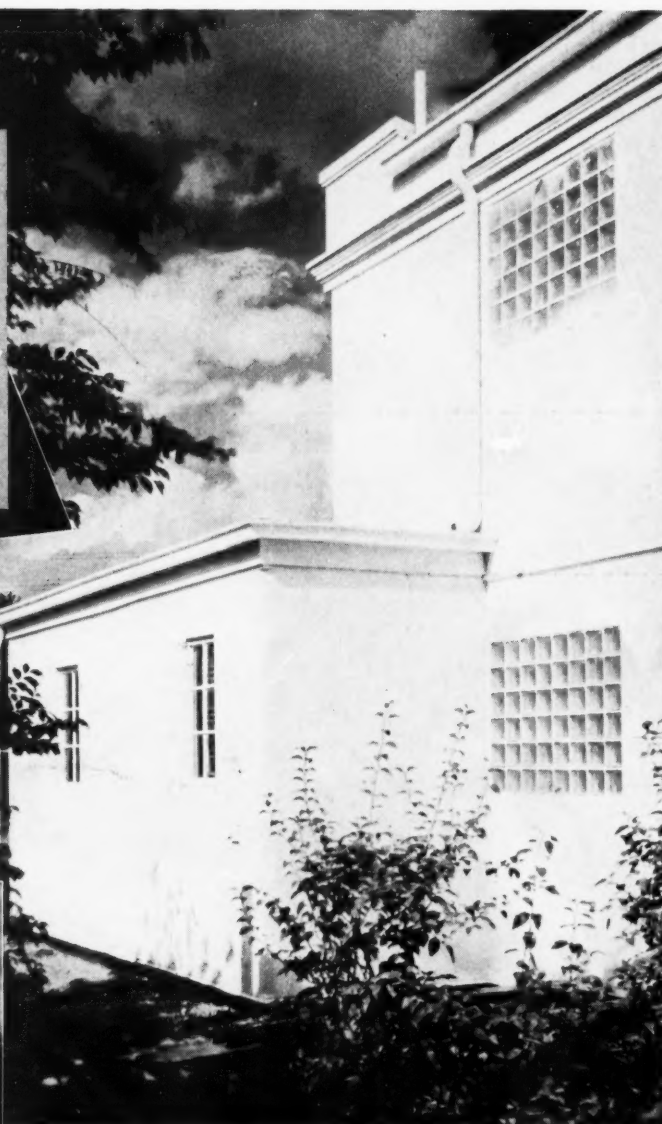


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DECEMBER

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**SELL BEAUTY
FOR** *Profit*



Note gutters and downspouts painted immediately upon completion of house. This attractive and harmonious appearance was made possible by using Armco Paintgrip drainage products.

Beauty appeals to everybody. This is why galvanized Armco Paintgrip sheets help you sell more jobs—earn more profits with less selling effort.

You can offer prospects the beauty of immediate painting plus the full protection of galvanizing on exposed sheet metal work. No more acid etching or weathering. Economy is another powerful inducement. Armco Paintgrip saves money on paint jobs. The special Paintgrip coating preserves the essential oils, makes the paint last longer without peeling or flaking.

And be sure to tell your customers that a base metal of ARMCO Ingot Iron will add

years of trouble-free service. They are familiar with this durable iron and will accept it readily.

Remember, only ARMCO Ingot Iron Paintgrip sheets offer these strong selling advantages. Use them for more sales and greater profits. Ask your Armco distributor salesman for complete information or write us direct. The American Rolling Mill Company, Executive Offices, 2550 Curtis Street, Middletown, Ohio.



• LISTEN TO THE ARMCO BAND •

Every Sunday afternoon at 3:30 o'clock (E. S. T.) starting January 2, 1938. Dial the nearest Blue Network station of the National Broadcasting Company.

ARMCO *Paintgrip* **SHEETS**

ALL-YEAR-AIR

CONDITIONED



Model
A-37

AN ILLINOIS dealer writes: "This Auburn direct specialty selling idea surely woke me up and showed me how to make as much profit on one sale as I used to make on half a dozen" You, too, can make more money with this remarkable new combination of complete winter air conditioning plus summer cooling. Write for details.

AIR CONDITIONING DIVISION, Auburn Automobile Company
General Sales Office: 2426 Michigan Avenue, Chicago. Factory: Connersville, Indiana

In This Issue

DURING 1937, the editorial representatives of American Artisan traveled many thousands of miles and interviewed several hundred contractors. Big cities and small towns were visited. Contractors handling jobs over one million dollars and contractors whose largest contract was two hundred dollars were called upon.

Out of the tremendous mass of data and ideas and suggestions one fact stands clear. That during the next few years the need for better management is going to be the most important need of this industry.

We face this fact with a full understanding that, by and large, the men of this industry are not financial experts, nor even good accountants. We appreciate that some men have made money—much money—using the managerial brains of others.

But things are changing. There is going to be a very urgent need for every man in business to know to the last penny what it costs to take a job in 1938. The small leaks which might have passed unnoticed in 1936 now add up to a staggering overhead load of 1937.

And so, with these facts in mind we publish in this issue, as we have all during 1937, and will in 1938, articles on better management. See pages 15, 21, 24, 32.

★

In this issue, pages 23 and 28, are articles describing the new buildings used for research and some interesting facts behind the research program of two of the industry's largest manufacturers. These buildings, by themselves, are worth study. The activities behind the buildings are very definitely a part of 1938's contribution to better living.

★

In this issue, page 45, we conclude the reprinting of the tests of oil burning furnaces in the Research Residence. We regret that the length of the report made it necessary to publish the paper in three parts. Because this investigation has such an important bearing on oil firing we will try, so far as we are able, to supply missing sections if readers will request them.

★

In the November issue we published part 1 of a report on humidity tests made by contractors, supplemented by some data and suggestions of our own. Several readers have questioned the accuracy of our conclusions—even some of our data. For that November article and part 2, on page 48 of this issue, we assume full responsibility. We make no claims of laboratory tests, but we still think our question—"Why talk about 40 per cent relative humidity when you can't furnish it?" is very much to the point. Don't you?

★

And the editors wish every reader a Merry Christmas and a more profitable 1938.

AMERICAN ARTISAN

With which is merged

FURNACES
AND
SHEET METALS

AND

Warm-Air
Heating

Covering All Activities in
Gravity Warm Air Heating Forced Warm Air Heating
Sheet Metal Contracting Ventilating
Air Conditioning

J. D. Wilder, Editor

A. A. Kennedy, Assistant Editor

Brewster S. Beach, Consulting Editor

Vol. 106, No. 12 December, 1937 Founded 1880

CONTENTS

Did You Make a Profit in 1937?	15
Bin Method of Drying Seed Corn	16
Cadaver Tanks	18
Association Activities	21
Fibreglass Activities	23
Arnold Kruckman's Washington Letter	24
Exhaust System for a Steam Baking Oven	26
The Armco Research Laboratory	28
The Problem Corner	31
A Plan of Bookkeeping Accounts	32
The Editorial Index for 1937	79
New Products	83
With the Manufacturers	90
News Items	96
New Literature	76 and 98

THE AIR CONDITIONING SECTION

Oil Fired Furnaces in the Research Residence	45
Step-by-Step Conversion	47
Some Fallacies of 40% Relative Humidity	48
Air Conditioning in New Zealand	50
Patterns for Reducers and Offsets	52
Ducts of Welded Assembly	54
Heat Loss in Rooms Below Grade	56

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More than 8,000 Copies of this Issue are being distributed



PROFIT

It yields a steady stream of worthwhile jobs—if you will only cultivate it.



Go through any textile plant. Use your eyes—and you'll see vats, pans and cans in every nook and corner. Easy things for you to make, as you'll see by the pictures. Yet they pay you a nice profit—when you make them of Monel.*

Textile plants are continually in need of new utensils of various kinds: because chemicals, dyes and other corrosive liquids soon eat the heart out of the average metal. So tell the textile plant superintendents you can replace old, leaky vessels with new ones of corrosion resistant Monel. They'll be interested, for this reason:

The textile industry, like many others, is constantly told about Monel. Trade paper and direct advertising remind textile executives and operatives month after month that Monel is the long-life metal that fits their needs. So the men you call on know Monel is tough, strong, permanently rust-proof, and, highly resistant to corrosion, stays on the job long after other metals quit.

Textile superintendents in plants nearby will turn jobs your way—so long as you let them know you can make them of Monel. Incidentally, you'll find Monel a swell metal to fabricate—tough, yet easily worked. Write for further information about Monel, and methods of fabricating. Address:

THE INTERNATIONAL NICKEL COMPANY, INC.

67 Wall Street

New York, N. Y.

MONEL



* Monel is a registered trade-mark applied to an alloy containing approximately two-thirds Nickel and one-third copper. This alloy is mined, smelted, refined, rolled and marketed solely by International Nickel.

*"Here's the Reason
I Standardized on
the H & C Air
Conditioning Line"*



"I've found that from this one source of supply I can get just the type of grilles or registers for every installation requirement.

"Take, for instance, the job that should have directional-flow registers adjusted on the job. The H&C No. 84 Design fits it to a 'T.' Reasonable in price, it combines attractive appearance and sound construction. The sectional adjustment feature offers the quickest and easiest means of accurate adjustment to any desired deflection of any register I've ever seen. And that's the way H&C Grilles fit in all the way up and down the line."

There are eight distinctive designs in the H&C line; all available in a choice of six installation frames. It will pay you to become thoroughly familiar with them. See them at your jobbers. No. 37 A.C. Air Conditioning Catalog sent on request.

Streakproof Rubber Gasket now furnished as standard on all 3-piece sidewall registers.

HART & COOLEY MANUFACTURING CO.

*Warm Air Registers
Damper Regulator Sets*



*Air Conditioning Grilles
Dampers, Chain, Pulleys*

61 W. KINZIE STREET, CHICAGO, ILLINOIS
ENGINEERING OFFICE AND FACTORY • HOLLAND • MICH.

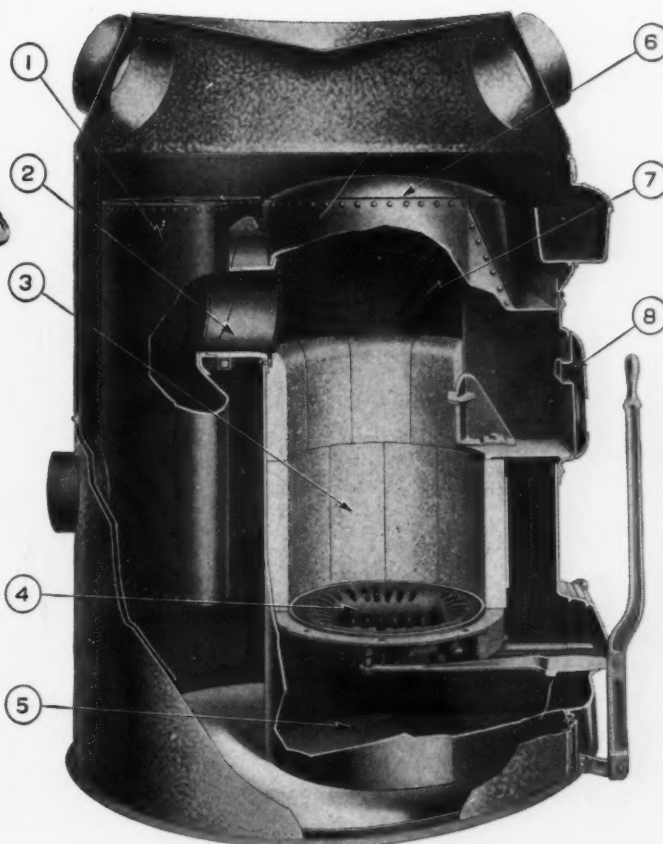
EVERY POINT'S a Point in Your FAVOR



HERE'S YOUR MODERN STEEL FURNACE THAT SELLS AT A COMPETITIVE PRICE. Check every point in this Sunbeam No. 500 series steel furnace . . . from its riveted and welded head to its "basket" grate and air-tight ash pit. Each one is a winning sales point for you.

1. **RADIATOR** is constructed of No. 12 gauge boiler plate, riveted and welded.
2. **SMOKE COLLARS** are of cast-iron construction. Collars join with a tongue and groove joint, and asbestos gaskets assure a leakproof connection.
3. **FULL HEIGHT FIRE POT** is 13½" high. Holds a deep bed of fuel. Permits long firing periods.
4. **BASKET GRATE**—Excellent combustion and easy removal of ashes and clinkers is assured by this type of grate.
5. **JOINTLESS ASH PIT**—No gas or dust leakage can occur in ash pit, as the base is welded to the drum.
6. **RIVETED AND WELDED HEAD**—Long life and leakproof construction is obtained by riveting and welding the head to the top of drum.
7. **DRUM** is constructed of No. 8 gauge boiler plate, riveted and welded. Construction of drum eliminates two vertical joints within warm air chamber.
8. **LARGE FEED DOOR OPENING** is approximately 13½" wide by 10½" high.

This steel furnace enables you to meet competitive prices with a high calibre furnace having many features found only in the higher priced heating plants. Series No. 500 Steel Furnaces come in four sizes, from 20" to 27" diameters. There are special stoker-fired and oil-burning models. Mail coupon for details.



Cutaway view of the Sunbeam Series No. 500 Steel Furnace.

SUNBEAM AIR CONDITIONING SCHOOLS

Sunbeam jobbers in co-operation with The Fox Furnace Company will stage Air Conditioning Engineering Schools in approximately 100 different cities. These schools will be held during the Winter

and early Spring of 1938. Progressive, intelligent heating contractors are invited to attend these schools. Return the coupon for complete information.

THE FOX FURNACE COMPANY, ELYRIA, OHIO
Division of American Radiator & Standard Sanitary Corporation

SUNBEAM
WARM AIR FURNACES AND
AIR CONDITIONING UNITS

The Fox Furnace Company,
Elyria, Ohio.

- ☐ Send me catalogs on your Series No. 500 Furnace and the other furnaces in the complete Sunbeam line.
- ☐ Send me information about your air conditioning schools.

Name.....

Address.....

City.....State.....

AA-12-37



Proper balance marks the difference between fair sailing and hard going in work as well as play. To earn a profit in your business, for example, you must maintain a balance between cost and selling prices, between wages and overhead expense, between too large and too small a stock of materials. These are easier said than done.

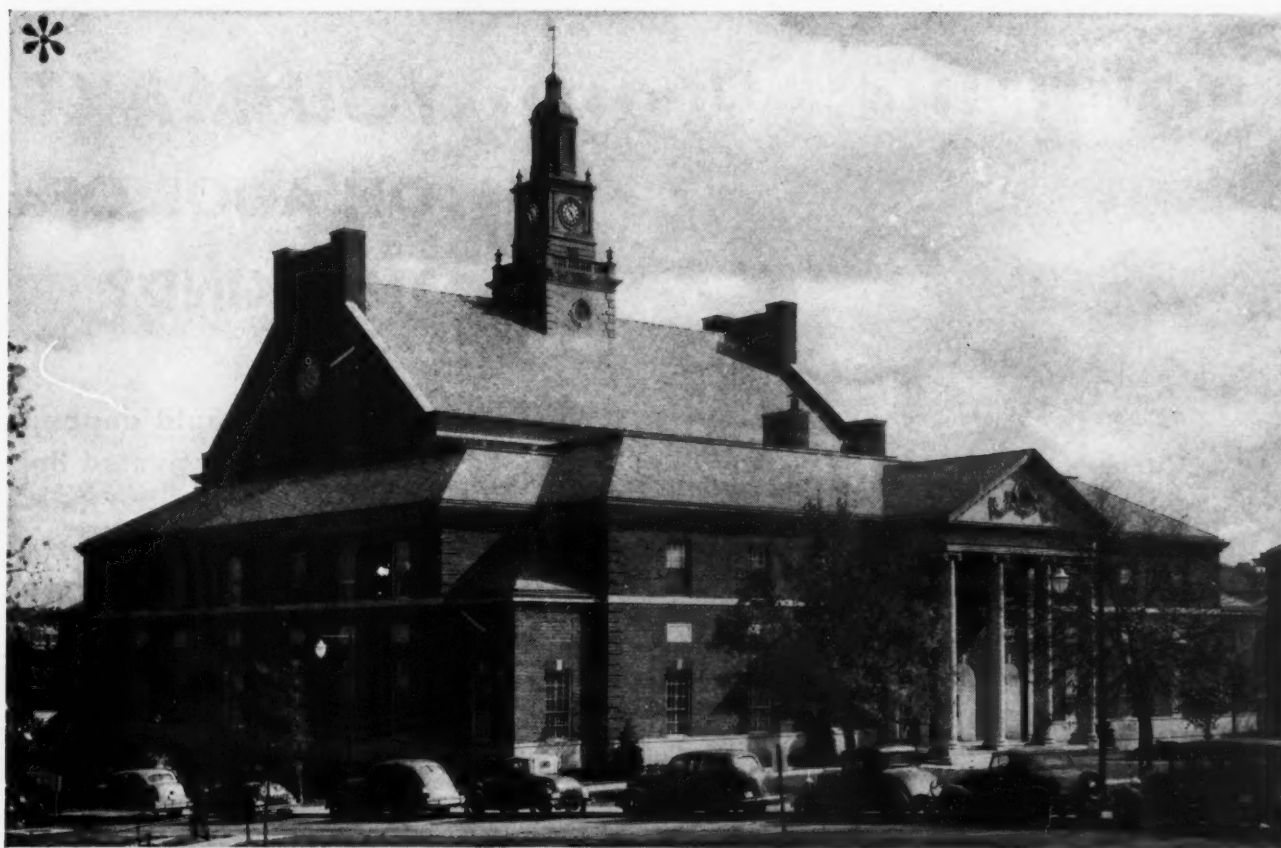
Thousands of sheet metal men have found the answer to the last of these problems—a balanced inventory—in Osborn service. Here, they can get promptly all of the materials and supplies they use in their sheet metal, heating and ventilating or roofing work; all of the

tools and machinery they need to keep their shop and installation costs at a minimum. Here too, they have the assurance when ordering that both they and their customers will be satisfied because every Osborn item is a leading brand or make.

Put an end to your own delay and worry of getting the right materials by letting Osborn serve you from three of the country's largest and most complete stocks. The 210 page Osborn Stock List makes it easy to keep your own stock in balance and to pick-out just the items you want for any job which may come up. Would you like a copy?

THE J. M. & L. A.
OSBORN Co
Manufacturers—Distributors
 BUFFALO • CLEVELAND • DETROIT
Metals and Metal Products

A DEPENDABLE SOURCE OF SUPPLY FOR 79 YEARS



New Students' Union Building at University of Cincinnati Protected by *Cheney Flashing*

The University of Cincinnati, at Cincinnati, Ohio, is famous as the first strictly municipal university in the United States.

Famous, too, is the exceptional practicality of its educational policy, which provides for supplementing theoretical instruction of its students by actual work in local shops and factories.

This sound, practical outlook is reflected in the use of Cheney Flashing in the recent construction of the university's new Students' Union Building, shown above.

Cheney Flashing is the through-wall flashing that provides a positive bond in all directions. This is accomplished

by the unique Cheney "Z" bends, which also automatically provide "weep holes" for drainage, and compensate for expansion and contraction. Interlocking lap-joints at ends of each sheet form a continuous, water-tight flashing without soldering.

Revere Thru-Wall Flashing is available at a somewhat lower price than Cheney Flashing, and is recommended where a bond in all lateral directions is sufficient.

Ask your distributor for Cheney Flashing, Revere Thru-Wall Flashing, Revere Sheet Copper and Revere Leadtex (lead-coated sheet copper) . . . or please write to our Executive Offices, 230 Park Avenue, New York City.

Revere

Copper and Brass

INCORPORATED

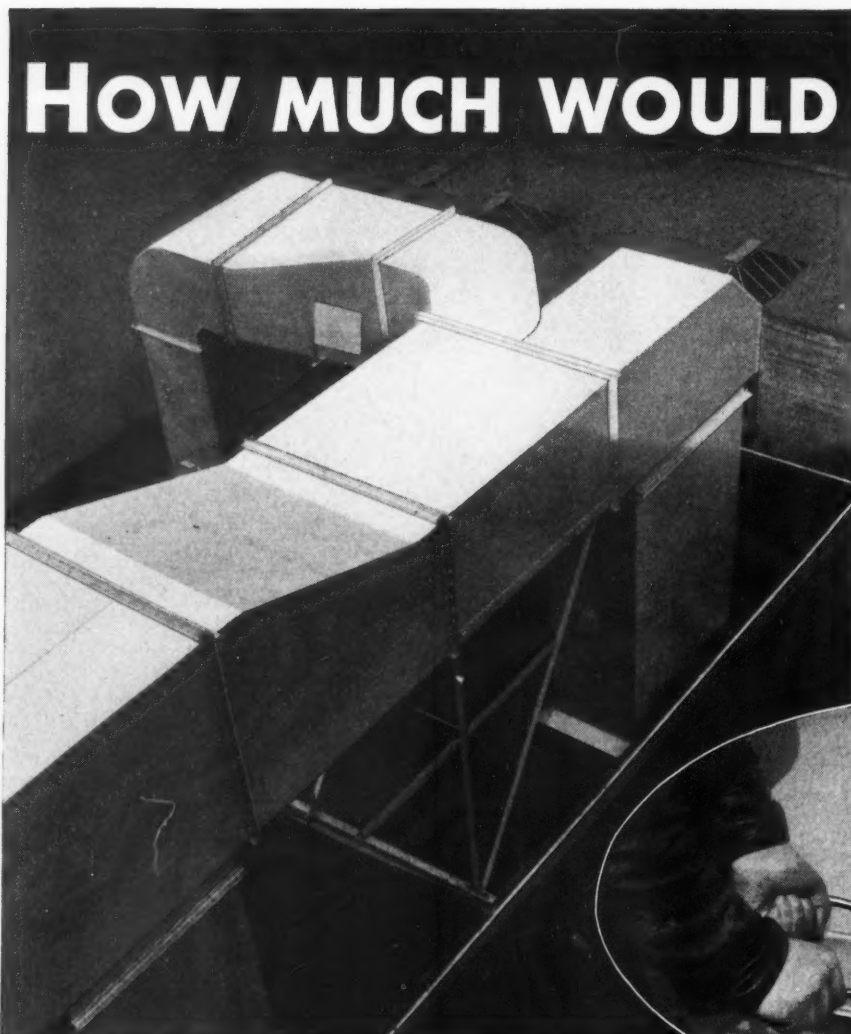
EXECUTIVE OFFICES: 230 PARK AVE., N. Y. C.

FOUNDED BY
PAUL REVERE

1801

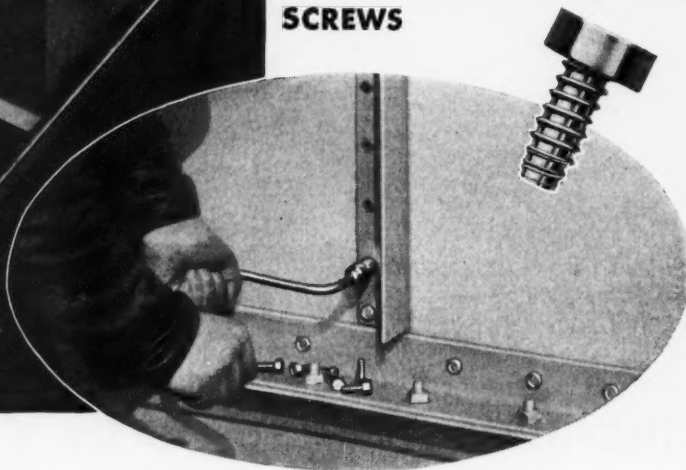
*Students' Union Building, University of Cincinnati, Cincinnati, Ohio. The Architect for this building was Harry Hake, 2400 Gilbert Avenue, Cincinnati, Ohio. Cheney Flashing used in constructing this building was furnished through the Huenefeld Company, Cincinnati, Ohio, and installed by Edward Meyer & Co., Cincinnati, Ohio, Sheet Metal Contractors. Other Revere material used for this job included 5,550 lbs. of Revere SPS Copper Pipe, furnished through Crane Company, Cincinnati, Ohio, and installed by B. A. Waltermann Co., Cincinnati, Ohio, Plumbing Contractors. Revere also furnished 3,000 lbs. of architectural bronze to Metalcrafts, Inc., Cincinnati, for architectural detail on this building.

MILLS: BALTIMORE, MD. • TAUNTON, MASS. • ROME, N. Y. • DETROIT, MICH.
NEW BEDFORD, MASS. • CHICAGO, ILL. • SALES OFFICES IN PRINCIPAL CITIES



HOW MUCH WOULD YOU MAKE ON A JOB OF THIS KIND?

Your profit would depend on whether you riveted the large sections or used time-saving **PARKER-KALON HEX HEAD SELF-TAPPING CAP SCREWS**



THIS big ventilation job at a paint and varnish plant in Long Island City proved that all sheet metal workers should know about *Hex Head Hardened Self-tapping Cap Screws*...a product of Parker-Kalon, makers of the famous Sheet Metal Screws...especially suited to the assembly of sheets and plates up to 6 gauge, and structural shapes.

After starting this job, the contractor found that he would actually lose money if he had to rivet the sections. Too large and unwieldy to build in his plant, the sections had to be erected at the site. To rivet them

would have involved the erection of expensive scaffolds, or use of a chair swung in ducts. Work would have been costly, difficult, slow.

A trial of Parker-Kalon Hex Head Self-tapping Cap Screws solved the contractor's problem. *Driven from the outside*, they eliminated the need for men inside of ducts. Rapidly applied with a brace-type socket wrench, they saved hundreds of hours of labor. From the standpoint of strength of fastenings, they assured ample security; rivets placed under the conditions existing would

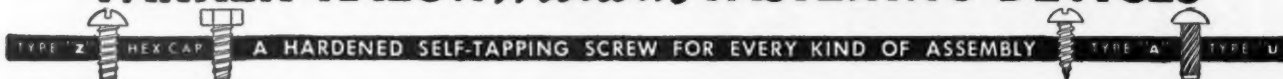
not have been as dependably secure. *Most important, they enabled the contractor to make a good profit.*

Try Them For This Work

Your work on smoke breechings, flues and evacuation systems...any job that requires assembly of sheet metal up to 6 gauge, steel plates and structural shapes up to $\frac{1}{2}$ inch thick...can often be done in less time, at a better profit, by using Hex Head Self-tapping Cap Screws. They are companion cost-cutters with the famous Parker-Kalon Sheet Metal Screws. Use the coupon to get full information and free samples.

PARKER-KALON CORPORATION
190 Varick Street New York, N. Y.

PARKER-KALON *Modern* FASTENING DEVICES



PARKER-KALON CORPORATION, 190 Varick Street, New York

Send me folder of information and free samples of Hex Head Self-tapping Cap Screws.

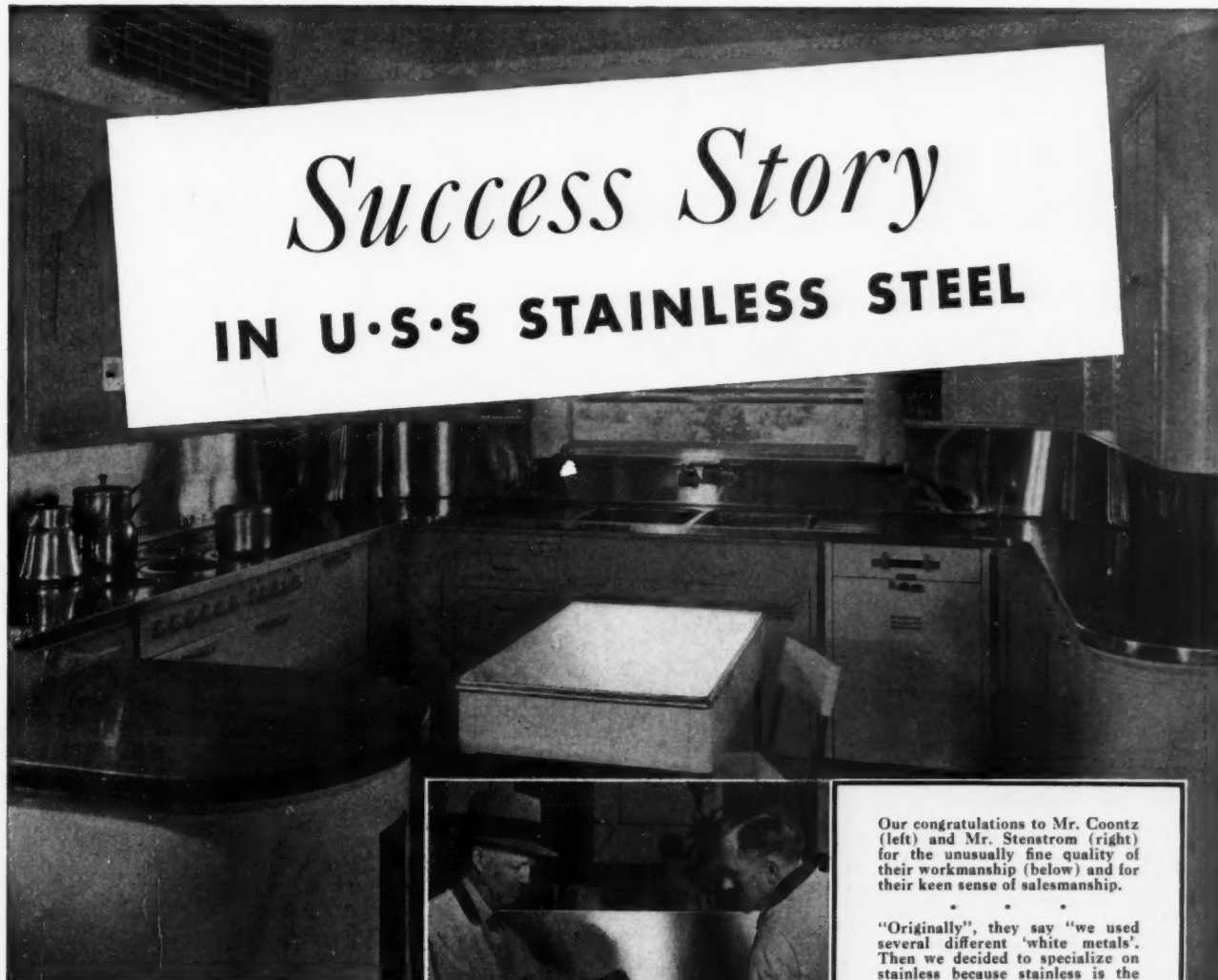
Name, Title _____ Company _____

Address _____

**SEND FOR
FOLDER AND
FREE SAMPLES**

Success Story

IN U·S·S STAINLESS STEEL



IN February 1936, there was no Modern Metals Manufacturing Company in Los Angeles.

There were only Mr. Coontz and Mr. Stenstrom and an idea.

Their idea was very simple. They knew that clean, sparkling materials have a tremendous human attraction. They knew that cleanliness and sanitation are essential in kitchens and restaurants. They knew that there is a great public demand for the newer, modern metals. They sensed an opportunity.

So in March 1936, Mr. Coontz and Mr. Stenstrom went into the business of specializing in attractive kitchens, restaurants, bars and pantries ex-



Our congratulations to Mr. Coontz (left) and Mr. Stenstrom (right) for the unusually fine quality of their workmanship (below) and for their keen sense of salesmanship.

"Originally", they say "we used several different 'white metals'. Then we decided to specialize on stainless because stainless is the only 'white metal' which can permanently maintain its silvery surface against food products and weathering. Now we are using U·S·S exclusively because of the help they give use on special problems and because our customers recognize 'United States Steel' as the finest name in steel. When they buy stainless equipment, they want the finest."

cuted in modern metals. They picked a good name—Modern Metals Manufacturing Company—and they went out actively to solicit business. To home owners, they offered pride-of-possession. To restaurateurs, they offered low maintenance, unlimited life and a money-making investment.

Today neither Mr. Coontz nor Mr. Stenstrom has to spend much time soliciting business. In fact, they can't

because they haven't time to spare. Their busy shop employs ten skilled workers and is already booked to capacity for several months ahead.

Stainless steel offers progressive fabricators a world of opportunities. The metal itself has every characteristic necessary for creating new, attractive effects. And one sale promotes a hundred others. For further information, consult our nearest sales office.

U·S·S STAINLESS STEEL

AMERICAN STEEL & WIRE COMPANY, *Cleveland, Chicago and New York*

CARNEGIE-ILLINOIS STEEL CORPORATION, *Pittsburgh and Chicago*

COLUMBIA STEEL COMPANY, *San Francisco*



Columbia Steel Company, San Francisco, *Pacific Coast Distributors* • United States Steel Products Company, New York, *Export Distributors*

UNITED STATES STEEL

TRUSSTEEL

*The Outstanding Line of Registers
and Cold Air Faces for 1938*

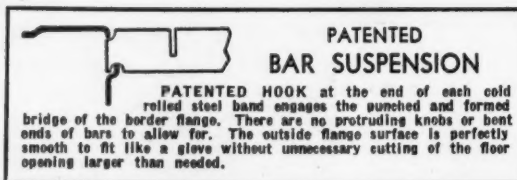
TRUSSTEEL

New beauty is brought to the bar-type assembled register with the new natural wood graining of the U. S. Trussteel. No cheap hand graining or streaked imitation, but actual photographic reproduction transferred by the latest power driven equipment. Trussteel gives you ample free area, close mesh to keep out French heels, sturdy engineered construction throughout.



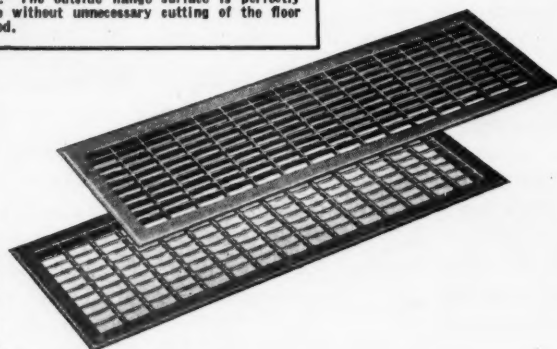
EMBOSSSED

"WORLD'S STRONGEST FLOOR REGISTER" is the REPUTATION WON by this line everywhere. U. S. PRESSED STEEL REGISTERS get their strength from the heavy reinforcing bars spaced every two inches the narrow way. The NEW NATURAL GRAIN FINISH adds to the beauty of this popular line.



MATCHING COLD AIR FACES—

—are supplied in both the Trussteel and Embossed Steel designs (U. S. Special Style)
—same beautiful new natural grain finish, same small mesh openings, and same super-strong construction.



PANAMA

Base Board Registers

The simple modern beauty, maximum free air capacity, and easy installation features of the Panama, keep this design in the forefront of national popularity.

The one visible item of the heating plant that can be seen by the home owner when the installation is completed is the warm air registers and cold air vents. Insure his gracious acceptance by the silent and retiring beauty and efficiency of U. S. Registers at no extra cost.



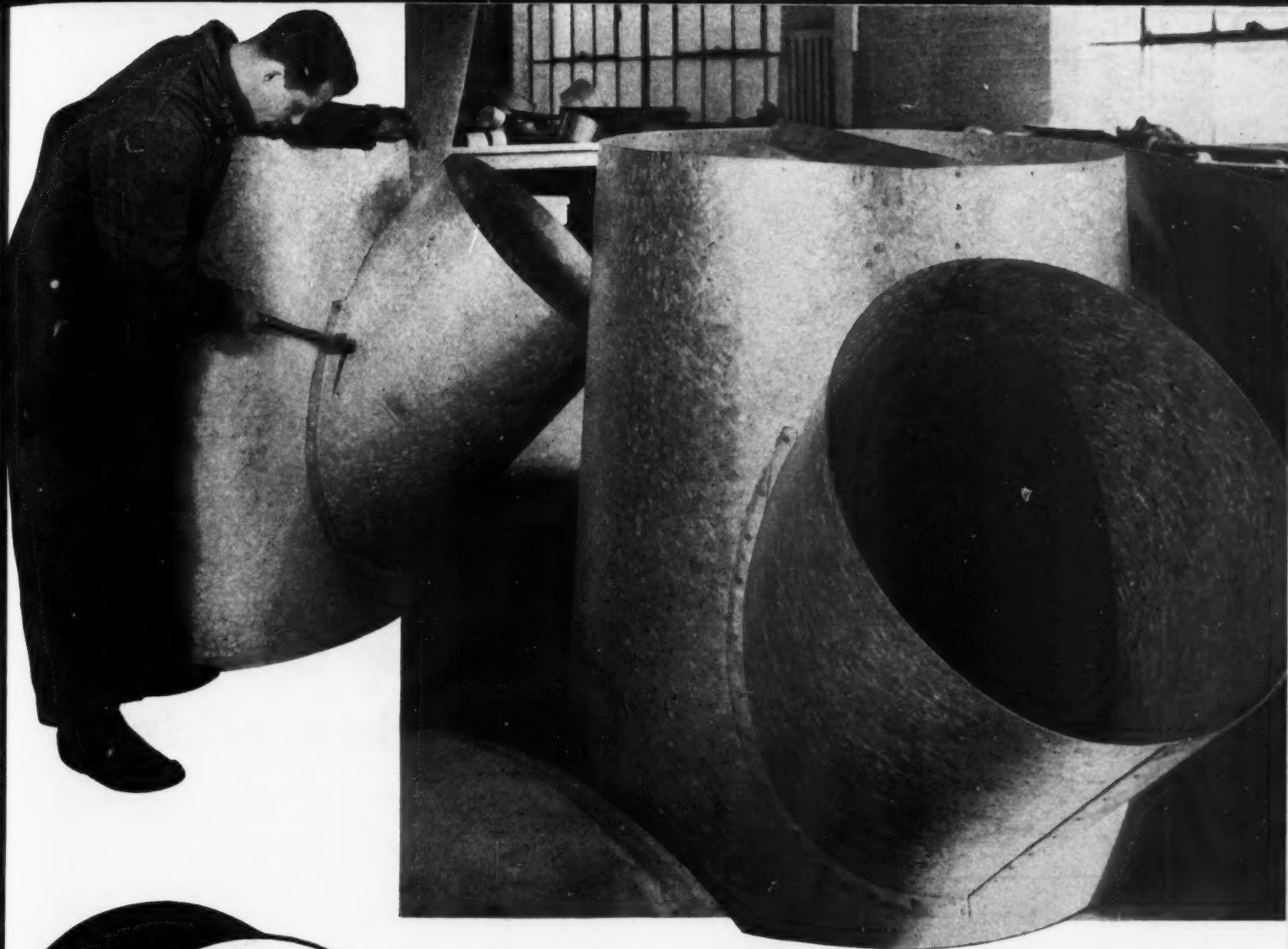
Watch for Announcement of New Air Conditioning Line!

UNITED STATES REGISTER CO.

BATTLE CREEK, MICHIGAN

MINNEAPOLIS • KANSAS CITY • ALBANY • SAN FRANCISCO • NEW YORK, N. Y.

"I can bank on the job WHEN I USE SUPERIOR SHEETS"



SUPERIOR GALVANIZED steel sheets are rolled from bars of special-analysis open-hearth steel, correctly tempered for shop work, and evenly coated with zinc by the SUPERIOR process.

"When I have SUPERIOR sheets to work with, it gives me confidence in my work. Jobs seem to shape up faster and truer. When the job is done I can bank on it being right."

After all, workability means everything in a sheet not only to the shopman but in the finished job as well. One secret of SUPERIOR workability is uniformity . . . of gauge, of coating, of temper . . . a straight line that marks the shortest route from plan to product. To enjoy the economies of this short-cut, use SUPERIOR COATED sheets.

THE SUPERIOR SHEET STEEL COMPANY
CANTON, OHIO

DIVISION OF CONTINENTAL STEEL CORPORATION, U. S. A.

SUPERIOR

OPEN HEARTH STEEL SHEETS

SUPERIOR GALVANNEALED
"SUPER-METAL"
SPECIAL COATED

GALVANIZED SHEETS
GALVANIZED ROOFING
LONG TERNES

HOT ROLLED ANNEALED
PICKLED and
DEOXIDIZED SHEETS

Donald C. Goss, Architect, designed this home in Marblehead, Mass.



A HIT!

Anaconda *Economy* Copper Roofing Wins Nation-Wide Acceptance

Important advantages of Anaconda *Economy* Copper Roofing:

1. **APPEARANCE**... Copper increases in beauty with age and service.
2. **DURABILITY**... Permanent in spite of time and weather.
3. **FIREPROOF**... Copper roofs eliminate flying spark hazard... earn lower insurance rates.
4. **LIGHT WEIGHT** makes costly supporting structure unnecessary.
5. **PROTECTS INSULATION** from damaging water or moisture.

37219A

Anaconda *Economy* Copper Roofing offers all the traditional charm and durability of copper roofing at a cost which has justified its extensive use on homes throughout the country.

Lighter weight (10 oz.) sheets lower material costs appreciably. Narrower sheets provide spacing of 13 3/4 inches between standing seams—a width in keeping with

small roof areas. This reduced spacing provides all the rigidity and wind resistance obtained with wider sheets of heavier metal.

Anaconda *Economy* Copper Roofing offers sheet metal workers a splendid opportunity to get profitable contracts. You have the men, the tools, the experience... why not go after this business? Anaconda distributors stock this roofing for immediate delivery.



Anaconda Copper

THE AMERICAN BRASS COMPANY, General Offices: WATERBURY, CONN.
Offices and Agencies in Principal Cities • In Canada: ANACONDA AMERICAN BRASS LTD., New Toronto, Ont.



Did You Make A Profit in 1937?

AS 1937 draws to a close, contractors in all parts of the country will once again cast up accounts to determine whether the year is in the black or in the red.

For most contractors, 1937 will probably show an increase in unit volume; in other words, most contractors sold and installed more furnaces or more fans or more conditioners, or handled more sheet metal contracts than they did in 1936.

In all likelihood these 1937 unit volumes will also show an increase in money value also; that is, the total money value of all work secured by contract will be above the money value of the work done in 1936.

But total money value is only part of the answer contractors will seek. What every contractor will want to know is, "Did I make a profit?" And if my unit or money volume for 1937 is above that of 1936 is my profit proportionately higher?

The answer to this all important question cannot be found by guessing. Nor can bookkeeping "on the cuff" furnish an answer worth the effort. Only those contractors who kept a real set of books and watched financial reports month by month will be able to tell the true story of 1937.

In most parts of the country all installation work carried a higher cost in 1937 than in 1936. Equipment has increased in price. Materials have been climbing slowly. Labor has increased generally; in some sections increased by leaps and bounds. Increased production by labor in too many instances did not increase in proportion to higher wages per hour.

As we have pointed out from time to time costs are only relative. It makes no difference what an item costs so long as that item can be sold for a fair profit, and providing the public has increased income to buy the item. That buyers' incomes have increased in 1937 is conceded, but higher costs of materials, labor and complete jobs have brought other complications into the picture.

All contract work has increased in cost. The result is it costs a buyer more to build a home or a store or a factory in 1937 than the same structure has cost for several years past. When prices increase, buyers are inclined to question the advisability of building at a price higher than the remembered price of 1936 or 1934.

Further, as prices increase, day labor contractors secure a hearing from the price-minded buyer. Even though these contractors may not get the job, they tend to set up price ceilings which the shop with average overhead finds difficult to meet. Where union labor is employed and work is restricted to all-union contracts, this day labor contractor is

not the acute problem he is in remodeling, replacement, repair operations which remain the backlog of this industry.

Joseph G. Dingle, in his series of articles on bookkeeping and cost accounting for 1937 conditions has set up new cost factors which the average or large shop must take into consideration. We believe that these suggestions might be carried a step further. We believe that from 1938 on, the average or large shop will find it absolutely necessary to know every thirty days just what it is costing to run the business. Annual accounting cannot meet the problems of 1938.

For example, assume an establishment having a sheet metal shop equipped to handle architectural metal work, ventilation or commercial air conditioning. Assume this shop also does residential, mechanical warm air heating. And to round out the operations takes contracts for the manufacture of specialty items.

It will cost such a shop a very definite amount of money each month, to cover the cost of selling, engineering, estimating, supervising. Every month so much goes into labor and materials according to the volume and production speed is not easily increased. It costs such a shop a certain amount of money every month to operate the salesman's cars, the trucks, to use the telephone, to buy or maintain equipment and tools. Every month certain portions of gross income must be set aside to pay local, state and federal taxes on property, gasoline, oil, labor wages, insurance and dozens of items making up overhead.

As Mr. Dingle pointed out, this monthly cost of doing business is fairly stable, with largest variations coming from fewer or more employees. Before any profit is realized a certain gross volume of business must come into the shop every month. Costs of running the establishment must not be allowed to increase without increased gross income or profit vanishes.

Seasonable variations in volume cannot be met financially by hoping that next month will be better. True, it is not always good economy to slash expenses everytime business slacks off, but the owner must gamble with his eyes open.

So far as we can judge, the operator who hopes to keep in business must from now on know every thirty days just what his business is doing in all departments. Just gross income and gross cost is not enough. Each item which goes into cost should be itemized so that the owner will know what costs are in line and what out of proportion.

As we see it 1938 should be a year of closer financial control.

The Bin Method of Drying Seed Corn^{*}

By A. H. Wright and F. W. Duffee
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Considerable activity is reported from different parts of the country in applications of warm air heating and conditioning of farm products. One such activity centers around the drying of seed corn. This article is part one of two explaining how furnaces and fans are used in Wisconsin.

THE bin method of drying seed corn has replaced all other commercial methods in Wisconsin. The method was developed at the Experiment station during 1926, and its suitability has been proven by five years of successful commercial use.

By the bin method, ear corn is dried rapidly, uniformly and thoroughly; a minimum of hand labor is required and costs are much reduced; the quality of the seed is improved; and disease is lessened.

The bin method of drying is intended for those who

make a business of producing seed corn. It is not practicable for the farmer who produces seed corn only for himself.

How the Bin Drier Works

Both in construction and operation, the bin method is very simple. Husked corn is delivered to the drier in the ear, and is shoveled into the bins just as corn would be unloaded into a crib. The depth of the corn in the bins is from six to seven feet. Warm air is forced through the bins from top to bottom for twelve hours and is then reversed and forced through in the opposite direction for twelve hours. The total time for curing varies from 72 to 96 hours. The air is heated to 100° F and the corn is dried to around 13 per cent moisture.

A drier of any desired capacity can be made. The usual range will vary from 500 bushels to 10,000 bushels or more a season, but a capacity of less than 500 bushels is not economical.

The equipment necessary for a bin drier is a furnace, a multivane blower, a series of bins, necessary power and a suitable building. The furnace heats the air to around 100° F; the fan blows the air through the bins filled with corn. (See Fig. 1.)

*Reprint of a leaflet of the same name, published by the Extension Service of the College of Agriculture, University of Wisconsin, Madison. Complete copies are available at a price of five cents.

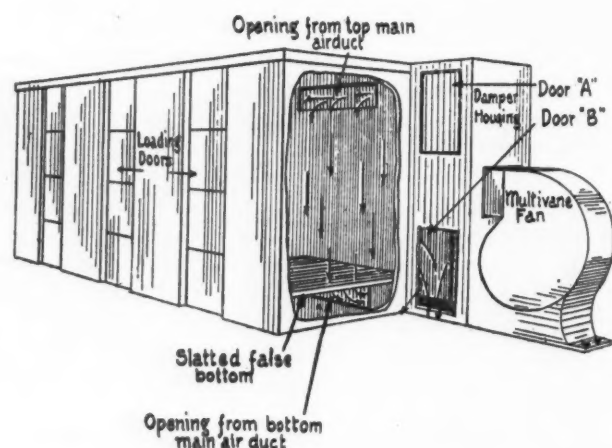


Fig. 1—General arrangement of equipment for drying seed corn. Air heated in a furnace is blown into the top of the bins and pulled through the corn back to the blower. About 50 to 75 per cent recirculation.

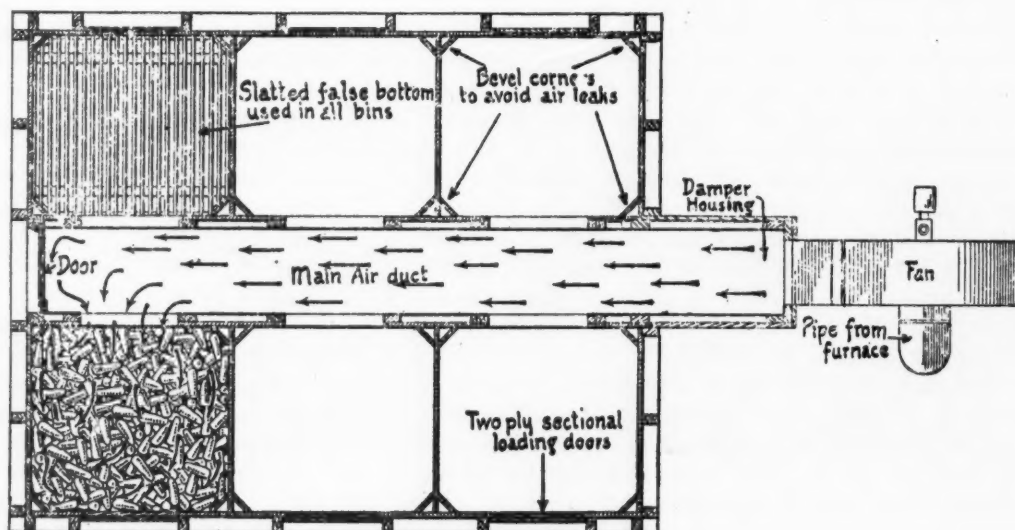
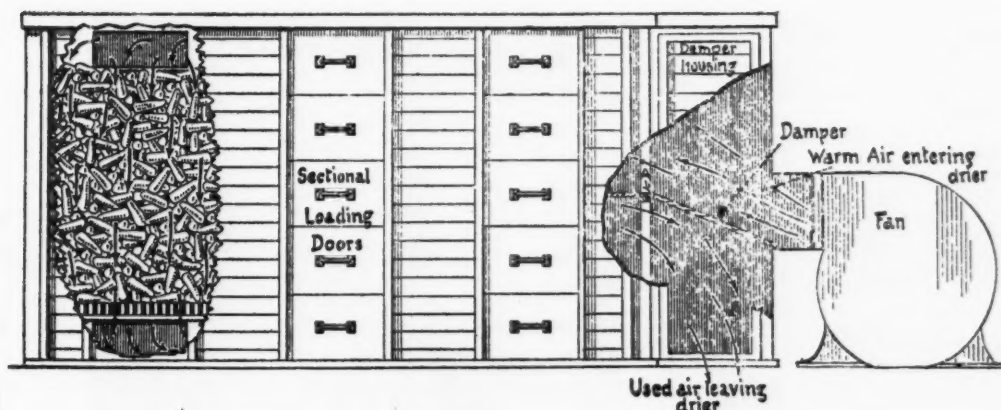


Fig. 2—Floor plan of bin arrangement showing two rows of bins with the central warm air supply duct.

Fig. 4—Side view showing loading doors and the damper which directs heated air to top or bottom of bins according to setting.



Details of Bins

The construction and arrangement of the bins are very important. The most satisfactory arrangement is two rows of bins with an alley three feet wide between them (Fig. 2). This alley receives the heated air from the fan and connects with the top and bottom of each bin. In this way the heated air can be conveyed to any bin as desired and by means of dampers the direction of the air in any bin can be controlled.

The most satisfactorily arranged alley is one with two compartments, one at the top and one at the bottom. This is accomplished by means of a solid partition running lengthwise of the alley one-half way between the top and bottom. (Fig. 3.)

By means of a simple flap damper at the end of the alley where the air comes from the fan (Fig. 4) the intake of the heated air can be directed either to the bottom compartment of the alley, it flows from the alley through the opening at the bottom of each bin, up through the corn, back into the top compartment and then out through a door at the end of the alley. By reversing the flap damper and adjusting the doors at the end of the alley, the air from the fan will enter the top compartment, flow through the opening at the top of each bin, down through the corn and back into the bottom compartment.

After the heated air passes through the corn and

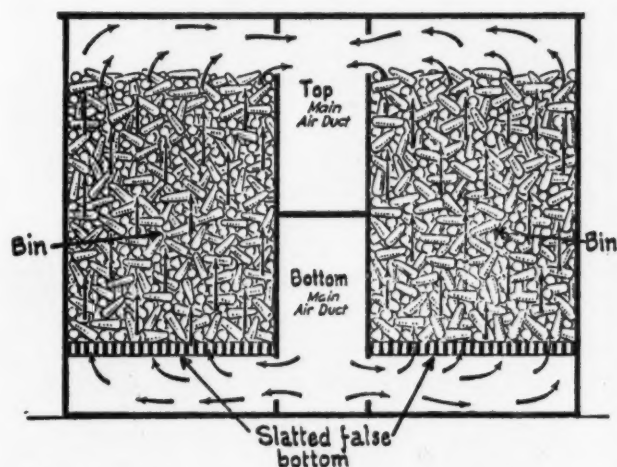


Fig. 3—Cross section of bins and double ducts showing air being blown in at bottom of bins and exhausted through top duct.

back into one or the other compartment, it flows out through an opening in front of the alley, and thence to the furnace or fan for re-circulating. Since the heated air is forced through the corn at a rate that does not allow it to make full use of its drying capacity, it is very important to re-circulate about 75 per cent of the used air. By doing this, the fuel bill can be reduced 50 per cent.

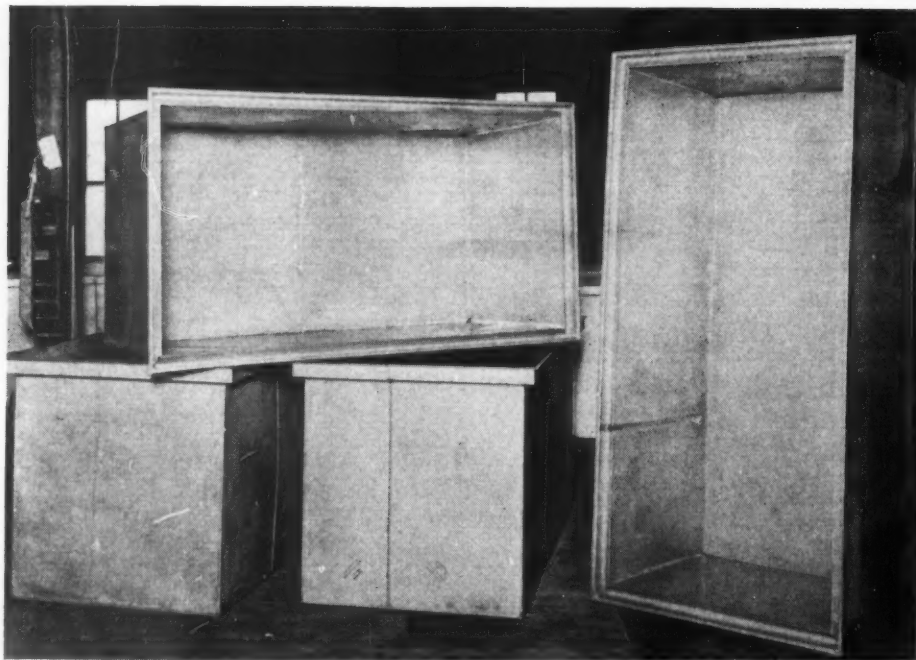
On the inside of each bin, through the wall which separates the bin from the alley, openings are made both at the top and at the bottom. These dampers allow the air to flow from the alley into the top or bottom of each bin. The size of each opening varies with the size of the bin, but is usually eight inches high and from two to three feet wide. When the bin is full of corn and drying is being done, neither opening is closed. In order to load or unload a bin, there should be an arrangement to close both openings in order to avoid escape of warm air or the necessity of stopping the fan. This can be done by a metal sliding damper working in a metal groove. The dampers for both the bottom and top opening may be connected so that both can be opened or both closed at the same time. By connecting a chain at the top of the sliding damper and running this over the top of the bin on small pulleys, the dampers can be opened and closed from the front of the bin.

Detail of Bin Construction

In any drier each bin is alike. A description of one bin, therefore, will explain all bins. About one foot above the floor (Fig. 4) is a false slatted bottom. In the back wall of the bin, connecting with the alley, there are two dampers; one at the bottom and one at the top; on the outside is a door for loading and unloading. The slatted false bottom supports the corn and allows the air to flow underneath. It is placed from 12 to 18 inches from the floor of the bin. It should be removable so that the bins may be cleaned out conveniently. In a large bin, it is necessary to make the false bottom in sections; otherwise, its removal is difficult. It is made of 1x4 slats placed edgewise about one inch apart. These slats should be held firmly in position and well supported by cleats at both ends, and also by cross cleats on the bottom.

The dampers, connecting with the alley, should be as close to the top and bottom as good construction will permit. Both of these dampers are left open when dry-

(Continued on page 20)



Cadaver Tanks

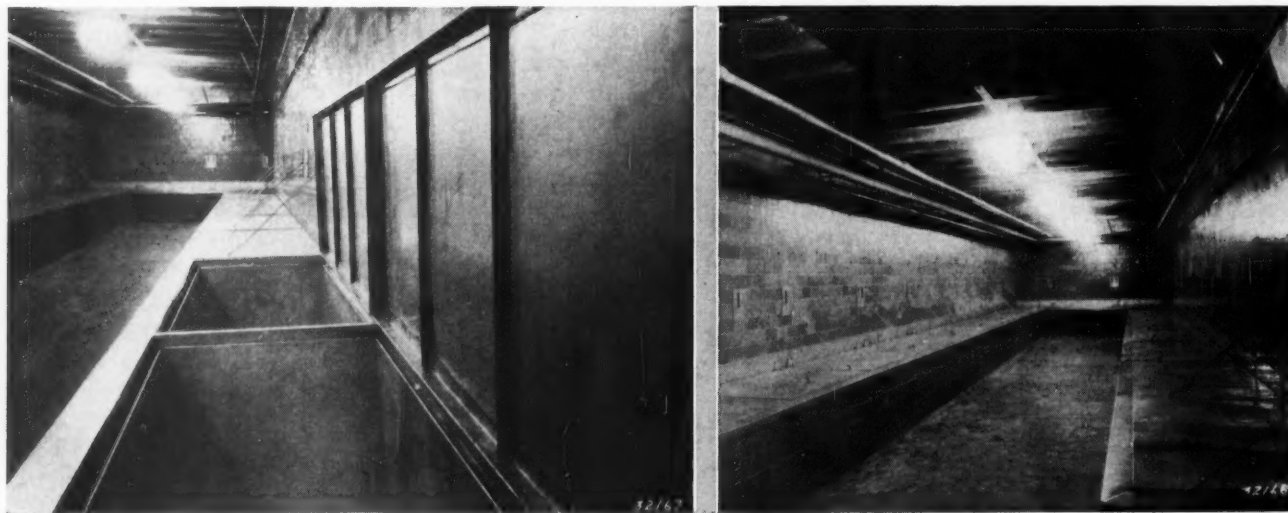
LAST summer the University of Indiana at Bloomington, let a contract to the Henry C. Smither Roofing Company of Indianapolis for the fabrication and installation of 19 special stainless steel cadaver tanks; each tank to be made as a unit in the battery, of special size and special design; complete with covers and weight opening covers.

The tanks as developed for fabrication in the Smithers design department are shown in one of the photographs of four tanks ready for shipment, but without the covers. These tanks are built of 22-gauge stainless steel with construction as shown in the photograph and in the drawing. To form the tank, stainless steel sheets 8 feet long and 42 inches wide were used. As will be noted in the drawing, the upper edge of each tank is formed into a recess to take the turned down edge of the cover. This recess, beginning at the outside, has a folded horizontal edge; followed by a vertical facing forming

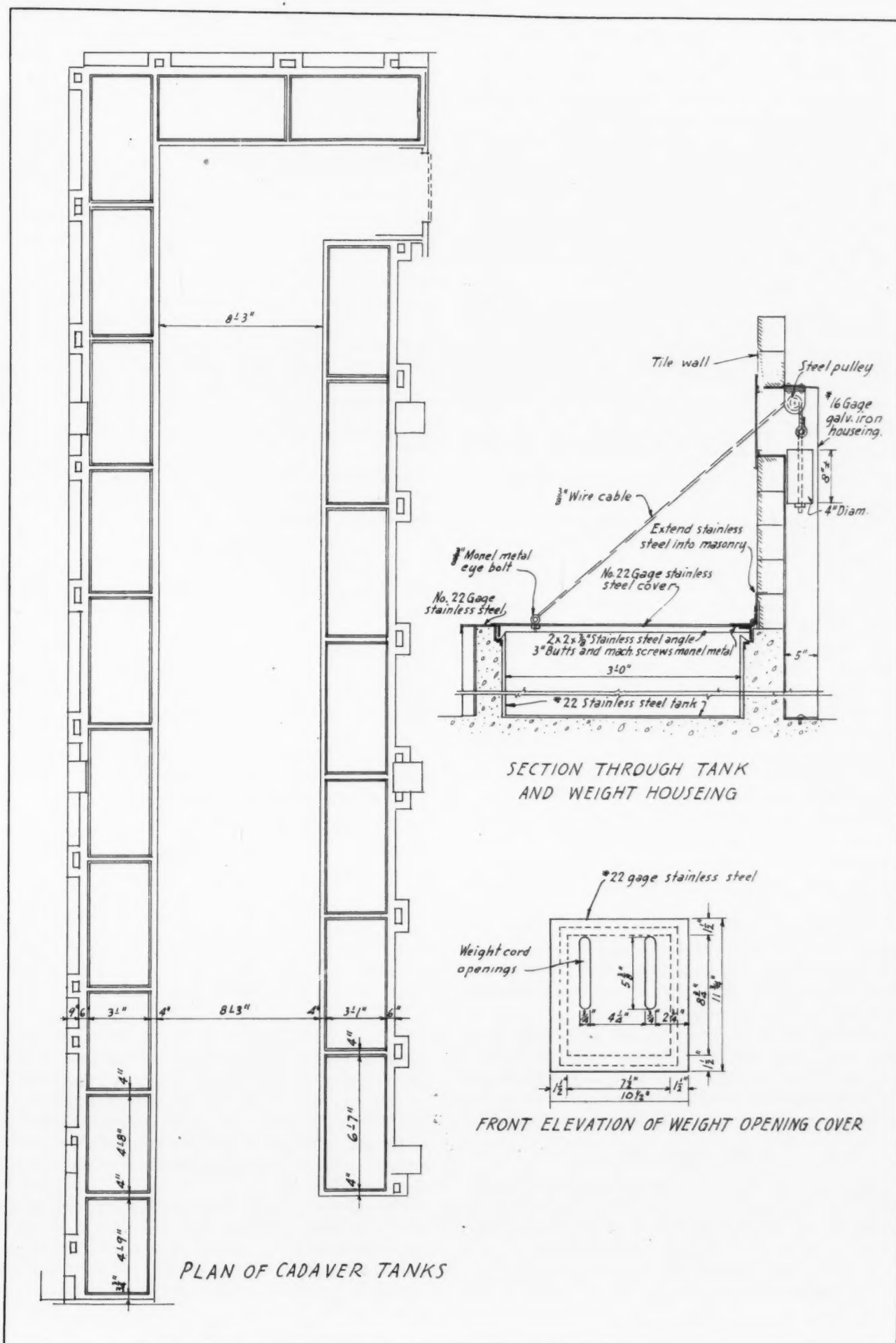
the outside of the recess; a $\frac{3}{4}$ -inch horizontal bottom of the recess; then a sloping inward back face from the top edge of which the tank side drops straight down to the tank bottom. The details and the photographs show this construction.

To avoid waste in cutting, the tanks were made up with a soldered seam in each vertical corner. In practically all tanks waste was eliminated by using short pieces with vertical seams, but with not more than one such seam in any one side or end. The photograph shows two tanks without any seams in end sections, but all four tanks with seams in the sides. In all cases tank bottoms were cut from one sheet to avoid any seams. To fabricate, the recesses were formed first in the power press; then double seams were made for the bottom, corners and to join short sections.

To assemble, the necessary pieces were selected to form the two sides and two ends. The sides and



Above—Group of tanks in Smither shop ready for delivery. Below, left—The battery installed with covers raised to show cover construction and cover recess. Right—Final assembly. All photos furnished by American Rolling Mill Co.



ends were then assembled and the bottom installed. All double seams were then pounded flat ready for soldering. In soldering all operations were done downward so that solder would flow into the seam, thus insuring liquid tightness and uniform strength. Stainless steel flux and common solder were used.

The tank covers are built up on a 2" x 2" x 1/8" stainless steel angle frame as shown in the photographs. The cover sheet was notched for corners and turned to form facings over the angle with enough extra metal to turn over the edge of the angle. When closed, the angle cover fits tightly into the recess of the tank which is filled with water to make a perfect air and vapor-proof seal.

Each tank sits in a concrete basin (with concrete between tanks in a row) so to complete the installation concrete cover strips were made to cover the partition between the tanks and the front edge of

the concrete basin. These strips were formed channel-shape to turn into the forward edge of the recess in the tank; carry across the 4-inch concrete wall and turn down over the tile in a folded edge. The strips were cut long enough to double lock at the half points of the tanks. Outside faces were bolted into anchors in the concrete.

The tanks stand approximately 4 inches apart in the row. This wall space is covered with a second strip which is formed as an open slip lock which is slid onto the folded horizontal edges of the tank.

To install, the concrete basin was flushed with grout to give the tank bottom a firm support; the tank was lowered into position and trued up. When all tanks in a row were in place and spotted for position the sealing strips between tanks were slid into place. Then the concrete basin strip was installed and strips were soldered.

Bin Drying of Seed Corn *(Continued from page 17)*

ing is being done, and both closed when loading or unloading.

The loading door (Fig. 4) should be not less than two feet wide and should extend the full height of the bin from the sill to the plate. In most driers these doors are made in sections, each 12 to 18 inches wide. The sections are made of double ply with both the ends and sides overlapping so that when in position the doors are nearly air tight and any section can be removed without disturbing the other sections. Any convenient arrangement of doors which will prevent air leakage is satisfactory.

So long as the bins are the proper height, they may be made any length and width desired. In driers of small capacity the bins are usually small. In those driers which have a capacity of 10,000 bushels or more the bins are comparatively large. Experience indicates that the most satisfactory depth of corn is from six to seven feet. The greater the depth, so long as satisfactory drying is obtained, the less floor space is necessary.

Since the top of the false bottom is fully 18 inches above the floor and since there is fully 6 inches of unfilled space at the top, a bin 9 feet high will hold a 7 foot depth of corn. Three sizes of bins, based on inside measurements are suggested:

(1) for a small capacity drier, the bins should be 4 feet wide, 5 feet deep and 9 feet high; (2) for medium capacity drier, the bins should be 5 feet wide, 6 feet deep, and 9 feet high; (3) for large capacity drier, the bins should be 6 feet wide, 8 feet deep and 9 feet high.

Material for Bins

Any material that will provide reasonably air tight bins may be used. Some driers are built entirely of lumber, some of hollow tile, others of lumber and mineral plaster board. Everything considered, a good grade of matched lumber seems most satisfactory.

It is not necessary to provide smooth walls for the bins, so siding may be put on the outside of the studing. It is a good plan to put a double wall between

adjoining bins. The roof may be of plain boards, covered with roofing paper, or of the same material used for covering the sides.

Number of Bins

The number of bins will, of course, vary with the size of each bin and the total capacity needed. Table I suggests the number and size of bins necessary for certain capacities. It is assumed that the average season for drying is around 40 days; that each bin may be reloaded six times in each drying season, and that 3.5 cubic feet of freshly harvested ear corn will produce one bushel of dried shelled corn.

Table I

Size and number of bins necessary for driers of various capacities; based on a total height of nine feet, which gives a net depth of corn of seven feet.

Capacity in bushels of dried, shelled corn in one drying season	No. of bins to provide the given capacity	Size of bins, inside meas. Width feet	Depth feet	Height feet
500	2	4	5	9
1,000	4	4	5	9
2,000	8	4	5	9
4,000	10	5	6	9
6,000	14	5	6	9
8,000	20	5	6	9
10,000	18	6	8	9

The end of the alley at which the warm air enters should be extended at least two and a half feet. Where space permits, three feet is desirable. This extension of the alley is to provide for the damper arrangement which directs the air to the top or bottom compartment of the alley. The extension also provides for doors or dampers through which the used air is exhausted from the bins. (Fig. 1).

The extension to the alley should be the same width and height as the alley and should be made of the same material as the bins. At the outer end of this extension, an opening half way between the floor and top should be provided for the pipe which conducts the heated air to the bins.

[To be continued]



ASSOCIATION ACTIVITIES

National Warm Air

The National Warm Air Heating and Air Conditioning Association reports arrangements completed for the winter and annual convention to be held in the Roosevelt Hotel, New York City, January 24, 25, 26, 1938. Incidentally the twentieth anniversary of the Association's research activity as carried on in cooperation with the University of Illinois, will be celebrated.

A complete program will appear in the January American Artisan Special Show Section.

Indiana

The Sheet Metal and Warm Air Heating Contractors' Association of Indiana's convention will be held at the La Salle Hotel, South Bend, in 1938. This will give the northern end of the State an easier opportunity of attendance, and will also invite the presence of guests from Chicago and Michigan.

The convention arrangements are in the hands of President J. A. Harris, of South Bend. He is assisted by a strong committee of local contractors. Mrs. Harris is chairman of the ladies' entertainment committee. Inasmuch as the convention this year will be strictly business sessions, morning, noon and night, special stress is being laid on ladies' entertainment, the idea being to keep them happy and satisfied while their men folks are busy with the convention work.

The date has been moved back to January 21 and 22. With so many shops closed on Saturday, it is thought that many contractors will be able to get away for one business day at the end of the week, who could not get away for two or three days in the middle of the week.

Several years ago the Association voted its authorization for a special privilege membership for material men. This will be instituted for the first time this year. The dues will be the same as for voting members, namely \$7.00 per year. The privileged members will be allowed to attend sessions but will have no voice in the deliberations of the Association. Revenue thus derived will enable the Convention Committee to provide a dinner Friday evening and luncheon Saturday noon, which will be furnished free to all registered members, both active and privileged. This will serve to keep the group together, and will result in considerable saving of time, as well as insure a satisfactory attendance at all sessions.

Exhibit space will be very limited, but the Association is making plans to follow the procedure of former years in having an attractive group of constructive displays in the space available. It is planned to have the meeting, display, lunch and dinner all on the same floor. This can be accomplished by the use of the hotel mezzanine and two other rooms adjacent to the main ball room.

The program is in the hands of Guy A. Voorhees. It is the intention of the program committee to concentrate the program principally on heating, ventilating and air conditioning discussions. Mr. Voorhees is planning to bring on several nationally known authorities on these subjects.

Paul R. Jordan, Executive Secretary.

Heating and Ventilating Exposition

The Fifth International Heating and Ventilating Exposition, otherwise known as the Air-Conditioning Exposition, will occupy three entire floors at Grand Central Palace in New York City during the week of January 24 to 28, 1938. Some 273 companies will be represented by displays. Practically all of the available exhibit space has been taken and a highly successful presentation is indicated.

The American Society of Heating and Ventilating Engineers will conduct their Forty-fourth Annual Meeting in New York during the same week.

Furnaces, boilers, burners, and heating surfaces will constitute an important section of the Exposition. Coal, gas and oil heating equipment will be characterized by many design refinements. In addition to the streamlining of cabinet enclosures, improvements will be directed toward more completely automatic operation in response to the outside weather; ease of operation, maintenance and cleaning; and fuel economy.

Canton, Ohio

The Furnace & Sheet Metal Contractors Association, Canton, Ohio, has a buffet lunch and social session after each meeting—the second Monday of each month at the Pythian Club. For the last three years they have had an annual picnic for members and their families, also every three months they have a ladies' night, with card playing, dancing and vaudeville acts. The good fellowship created by these meetings among men in the same business is an outstanding feature.

Many heating and ventilating problems are discussed and figured out on a large blackboard in the club rooms.

Ralph J. Peters, Secretary.

Milwaukee

The Sheet Metal Contractors Association of Milwaukee is working on a licensing code for municipal use—both contractors and journeymen.

The State Board of Directors is working on the program and Yearbook for the February Convention.

The Convention dates are February 7, 8 and 9 at the Republican Hotel, Milwaukee. One day will be devoted to a school on air conditioning and warm air heating. The other two days will be given over to problems of the industry.

Paul Biersach, Secretary.

Illinois

The Illinois Sheet Metal Contractors Association will hold their annual convention on January 19th and 20th in Peoria, Illinois. Charles Soedler and Ralph W. Poe have been appointed to the program committee and will contact all the jobbers and manufacturers possible for advertising for the program. They are endeavoring to cover all the territory thoroughly with invitations to attend the meeting.

Chas. G. Soedler, Secy.

Association Activities . . .

Chicago

The regular meeting of the Furnace, Air Conditioning & Sheet Metal Institute was held Friday night November 19th at 2051 Belmont Avenue. Election of officers for the coming year was held with Reid Mackin and Ray Lorenz as judges. The following were elected to office: Chairman—Rudolph H. Guenther; Vice-Chairman—Arthur Gisinier; Recording Secretary—Marvin Lawrentz; Financial Secretary—Peter Reif. Board of Directors: Messrs. Abele, Lehmann, Novak, Mike Reif, Fiebrandt, Schneider, Reinhardt, Trede and Drehobl.

Annual Ladies Night in honor of the retiring Chairman was held Saturday, November 29th, and before a large number of friends and members of the Institute, Louis Drehobl, retiring chairman, was presented with a gold wrist watch in appreciation of his services. Mr. Drehobl served as vice-president one year, and as chairman for three consecutive years.

Toledo

Paramount among plans of the Toledo Sheet Metal and Roofing Contractors Association, Inc., for the future is to perfect and to cause the enactment of a forced air heating ordinance to be presented to the Council of the City of Toledo, as an amendment to the Gravity Warm Air Heating Ordinance passed by the Council on May 10 of this year. The ordinance is now in the making and it is hoped to present it within sixty days.

Other plans are to lend every possible aid to the city

administration in the enforcement of the Gravity Heating Code; to serve as the Labor Relations Board; to continue to promote and to foster the Toledo Plan for Apprenticeship training; to serve as a clearing house for the exchange of ideas and to do everything possible incident to promoting the welfare of the industry.

At the present 63 of a possible 70 warm air heating shops are licensed under the ordinance which became effective on June 10 of this year.

Henry C. Bitter, Secretary.

New York City

The Joint Committee on Apprentices—representing the Employers' Association of Roofers and Sheet Metal Workers of Greater New York and Adjacent Cities; Heating, Piping and Air Conditioning Contractors New York City Association; Metal Covered Door and Window Manufacturers Association, Inc.; and Sheet Metal Workers' International Association, Local Union No. 28—has an apprenticeship system. These apprentices attend classes at Brooklyn Tech, New York Trade School, Harlem and Murray Hill Schools. Apprenticeship cards are given the students and exchanged as they earn promotion.

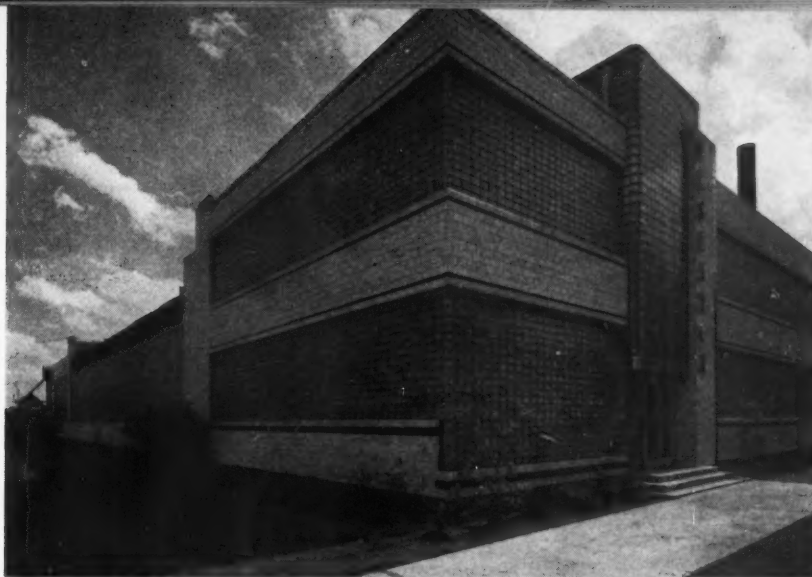
Exhibits are made at the annual closing exercises, usually some time in May. A gold and silver medal is bestowed upon the leaders in each school as a reward for extraordinary effort and skill. The gold medal carries with it an additional allowance of \$25 toward the student's initiation fee when applying for membership in Local Union No. 28.

Rules governing apprentices require that they apply themselves diligently to their duties and studies in school. They are required to carry their Enrollment Cards at all times.

Henry Weinberger, Chairman.

ASSOCIATION	SECRETARY	MEETS	PLACE	TIME
Association of Roofing: Metal & Heating Engineers of Philadelphia.....	Fred U. Ritter	4th Monday	Builders' Exchange Room 209 Brown Bldg., 4th & Chestnut Sts., Philadelphia.	8 p. m.
Board of Directors		Monthly 1st and 3rd Mondays	Convenient Locations	6:30 p. m. Dinner
Heating Discussion Class			Builders' Exchange	
The Cleveland Sheet Metal Employer's Association	M. J. Cutter	By notice, two or three times a month		
The Cuyahoga County Sheet Metal Workers' Association	M. J. Cutter	Every second Thursday	Cleveland	Evening
Board of Directors		Every Thursday		Evening
Employers' Association of Roofers and Sheet Metal Workers of Greater New York, Incorporated	Henry Weinberger	1st Thursday each month	2 Park Avenue, New York City	3 p. m.
Furnace, Air Conditioning & Sheet Metal Institute	Marvin Lawrentz	1st and 3rd Fridays	2051 Belmont Avenue Chicago	Evening
The Furnace & Sheet Metal Contractors Association	Ralph J. Peters	2nd Monday	Pythian Club, Canton, O.	
Master Sheet Metal, Furnace and Roofers' Association of Rochester, N. Y.	Roy G. Barnes	1st Monday	Builders' Exchange, Rochester	8 p. m.
Minneapolis Warm Air Heating and Air Conditioning Association	Arthur G. Hallgrain	1st Tuesday	210 McKnight Building	Evening
Sheet Metal Contractors Association of Milwaukee	Paul L. Biersach	Monday, December 6		8 p. m.
Sheet Metal Contractors Association of Wisconsin	Paul L. Biersach	Monthly		
Toledo Sheet Metal and Roofing Contractors Association, Inc.	Henry C. Bitter	2nd and 4th Wednesdays each month	Waldorf Hotel, 310 Summit St.	8 p. m.
Tulsa Sheet Metal Contractors Assn., Inc.	W. A. Conkling	Thursdays	Office of Roy Roller, Asst. Sec'y.	7:30 p. m.
Warm Air Furnace and Air Conditioning League, Inc.	J. H. Bauman	Every Monday	Cleveland Press Auditorium, Cleveland	8:15 p. m.

Fiberglas Activities



Owens-Illinois' Newark research and experimental laboratory. The walls are of glass block, a product of the Muncie, Indiana, plant. (C. Wilbur Foster, Indianapolis, architect.)

THE Owens-Illinois Glass Company dedicated the new Fiberglas research laboratory at Newark, Ohio, on October 20.

When plans for the dedication were being formulated it was revealed that the method of producing Fiberglass is the result of a discovery made by glass technicians in 1932 while they were seeking a process to improve the attractiveness of a milk bottle as a package. An attempt was being made to fuse color to the sides of milk bottles. One of the methods involved the use of a blow-torch—melting finely powdered colored glass and forcing it simultaneously under pressure against the milk bottle. The glass did not adhere, but was “blown” into tiny filaments that piled up in a fluffy mass alongside the bottle and weighed only about one pound per cubic foot.

Following this, machinery was invented to produce fibrous glass for insulation which became commercially practical early in 1934.

Fiberglas today is made by two methods developed by the Owens-Illinois Glass Company at Newark, Ohio. One is known as the “continuous filament” process, and the other is referred to as the “Staple fiber” method.

The manner of melting glass is identical in both

processes. Glass marbles are fed into electrically-heated furnaces. Each furnace, regardless of process, has a trough or V-shaped bushing made of costly metals of a higher melting point than glass.

"Continuous Filament" Process

Molten glass, entering the open or wide top end of the bushing, is “drawn” downward by gravity in the continuous process method, the glass emerging from 102 tiny holes in the bottom of the bushing.

The filaments, almost too small to be seen with the naked eye, unless light strikes the shiny fibers properly, combined to make one strand considerably smaller in diameter than human hair.

To be exact, the filaments average .00025 of an inch in diameter, and can be made with a diameter of only .00005 of an inch. Human hair has an average diameter of .0010 of an inch, cotton fiber averages .0004 and silk fiber diameters average between .00002 and .00004 of an inch.

The 102 filaments of glass fiber are combined to make one thread-like strand measuring .024 of an inch in diameter for winding upon spools. The spools are transferred to machines for fabrication into insulation tapes and cloths.

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Left—Silk-like fibers of glass from spools of yarn, fresh from the tank of melted marbles, being combined to produce wide beams.

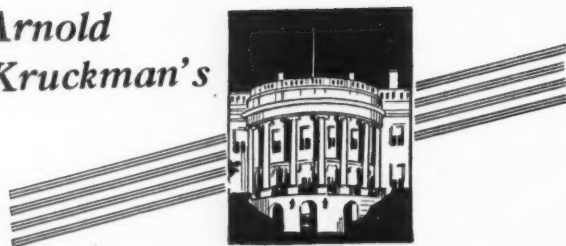
Center—Fluffy snow-white packs produced from glass.



Right—Thin mats, of thousands of strands of coarse and fine Fiberglas, on the production line toward the oil-impregnating chamber where the mats are sprayed with a special adhesive,



**Arnold
Kruckman's**



Washington Letter

MUCH as it may surprise members of the diversified construction industry, there is a difference of opinion about the housing program proposed by the President. Senator Glass and other Democrats vigorously oppose the plan, organized labor is lukewarm and the leading figures of American industry regard it with more hope than faith.

How Housing Started

To understand the situation it is necessary to know what led up to the proposal popularly regarded as the President's Housing plan. Several months ago various divisions of the construction industry quietly appealed to the United States Chamber of Commerce to initiate action that might lead to a revival of residential building. The Producers' Council and the Construction League of the United States were consulted, and officials of the Government were consulted, the "exploratory conversations" finally resulting in a call for a conference November 17 and 18 on local residential construction that was issued by the Construction and Civic Development Department of the Chamber of Commerce of the United States.

Meanwhile the "recession" became painfully apparent. For some reason, the President did not become aware of the gravity of the slump until after it was only too clear to the rest of his fellow-citizens. It is quite possible that the local slump in Washington finally made the picture clear.

In anticipation of the balancing

of the budget, many Government agencies in Washington for months past have been discharging employees. These unfortunates, hailing from all parts of the nation, rapidly numbered thousands. As they tramped from one Government department to another, looking for jobs, the local situation became more acute. And since there were no jobs and jobs daily were growing less in number, many of those thrown out of work began to go back home, to California, Iowa and to all the other States from which they had come.

This exodus, carefully unpublicized by the Government publicity machine, emptied Washington's apartments and dwellings, made astonishing deficits in Washington's markets, corner drug stores, department shops and all the other businesses that live on the 100,000 Government workers.

Washington Forms a Plan

The national slump broke upon Washington with the unexpectedness of a thunder storm in mid-winter. And everybody, from the President down, feverishly sought something to stem it. Over in the Department of Commerce, Assistant Secretary of Commerce Ernest Draper had long been much interested in the conference on housing called by the Chamber of Commerce of the United States. One of his chief lieutenants, Lowell J. Chawner, chief of Construction Economics, had agreed to make one of the principal addresses. Harold A. Mer-

rill, assistant Executive officer of the National Resources Committee, in the confidence of the President, also was to speak. Also Chairman John H. Fahey of the Federal Home Loan Bank, and Administrator Stewart McDonald of the Federal Housing Administration, and finally Administrator Nathan Straus of the U. S. Housing Authority.

Under the leadership of Mr. Draper, these and other elements in the Government, set out to formulate a plan, based on a revival of the construction industry, to present to the President as a method to lick the incipient depression. The plan eventually outlined in the President's message, and crystallized in the Wagner-Steagall bill, is the essence of the ideas produced by these Government officials. Curiously enough, most of these ideas, in piecemeal fashion, had earlier been presented by various speakers at the conference summoned by the U. S. Chamber of Commerce. This picture of the genesis of a Presidential message and a national law may be interesting not only by reason of the special interest of the trade, but because it is typical of the way in which many messages and laws come into existence.

Frozen Capital

It was just before the conferences began that the President released the trial-balloon announcement about his plan to put life into the construction industry by securing modifications in the National Housing Act.

Of course, the major purpose of the President's plan is to provide the glowing warmth that will melt the private capital frozen in the banks of the nation. The idea is to encourage smaller loans, larger loans, more loans, easier loans, and loans at less cost to the borrower, if he will spend the money in making repairs to his house, or buy new equipment for it, or build new houses, be they small one-family houses or huge model apartments.

The details of securing the loans through the Federal Home Loan Bank, through the mort-

gage associations to be formed by the RFC, and through private banks which will accept the insurance on the loan issued by the Federal Housing Administration, have been explained repeatedly and with much painstaking care over the radio and by the general press. The object is to turn loose a flood of money which during the next five years the President estimates will aggregate at least sixteen billion dollars, to be spent on building materials, equipment and labor.

Of course the success of the plan depends upon cooperation of the various parts of the construction industry as well as the cooperation of the banks, and of business in general. Primarily it would seem to depend upon confidence. And that is where there seems to be a slight hitch. Leaders of industry and business who participated in the preliminary construction conferences were ultra cautious about committing themselves to anything.

Business Makes Suggestions

There is reason to believe that some of these leaders of industry and business, at the conclusion of the construction conferences, sent a message to the President through a sympathetic intermediary because they feared the appearance of a leader of industry or business at the White House might be misunderstood. There are reasons to believe that FDR was told it would be much more useful to bring about commercial modernization than to accomplish residential modernization at this time.

To achieve this result, and to revive business involving extensive financial commitments, it was suggested that the Administration should give definite guarantees that the Government would not further enter the fields of business, and that it would not countenance more legislation calculated to interfere with the established, legitimate, orderly processes of business; and, that the undistributed profits and surplus taxes, the capital gains tax, and the holding company tax, be materially modified.

It is also understood that it was made clear the finance adventures of the Administration, including the Housing plan, are considered inconsistent with the system upon which our socio-economic structure has been erected and that the banks and building and loan association are fully capable of financing all needs of all homeowners capable of supporting loans. There was a hint that in effect the new Housing plan might largely turn out to be another well-disguised pump-priming operation, entailing considerable losses to the taxpayers.

Farm Income Rising

Meanwhile, things do not seem to be quite so bad as many agencies would have us believe. The farmer, this year, receives a cash income of more than nine billion dollars, which is equal, almost, to his income in 1929, which set an all-time high record. His income this year is more widely beneficial to the whole nation because it is more evenly distributed than farm income has ever before been distributed in the history of the nation. What is more, the farmer is spending his income to make many improvements, and to acquire many new things.

The Rural Electrification Administration reports that it has wired more than 150,000 farm homes for electricity this year, and that it has commitments to wire at least that many more during the next year. It may be interesting to know that immediately after electricity is brought into the farm home, almost 90 per cent of the farmers buy—with Government financing—new radios. After the radios, come electrical pumps and water piped into the kitchens; and then comes the bathroom.

The Government agencies have discovered that the introduction of electricity almost concurrently stimulates improvements to the home building, to the barns, and to other farm buildings. It has been found that the major improvement makes the farmer eager for other improvements, including roofing, piping, sheet-

metal work, better or more modern heating equipment, everything that will add comfort to the family life. The Government encourages these improvements by every means available through the agency of its various farm finance units.

This authentic picture of current prosperity among one-third of the population of the country, and affecting 2 out of every 5 citizens of the United States, is particularly striking as a contrast to the fight in Congress over the farm bill. The ultimate purpose of this bill, with its inevitably large appropriation, is to perpetuate the prosperity of the farmer.

The same purpose is behind the effort of Secretary of State Hull to negotiate a trade agreement with England. It is assumed this trade agreement will open a perpetual market for the farmer's surplus crops. The main opposition comes from the leaders of the chemurgic movement, composed of scientists and industrialists and others who believe in sky-high tariffs. The chemurgic movement seeks by scientific experiment in laboratories to find industrial uses for farm products. Down South it has already provided a market for the surplus of yams and sweet potatoes which it transforms into commercial starch. It makes commercial fuels out of some grains; and it makes automobile hubs out of soybean pulp.

The pressure on Congress to modify or repeal the undistributed profits tax, and the capital gains tax, during the special session is tremendous. Many, probably most, members of Congress sincerely and earnestly want immediate action. But the trouble is that if these taxes are changed or eliminated, Congress has been told by Treasury officials that such action might throw the whole tax schedule out of kilter. The Treasury people, and the members of the Congressional committees responsible for national finances, feel that it is not safe to tinker with taxes or appropriations until Congress is able to make a budget. It will not be able to set up its budget until after January 15.

Vapor Exhaust System For A Steam Baking Oven

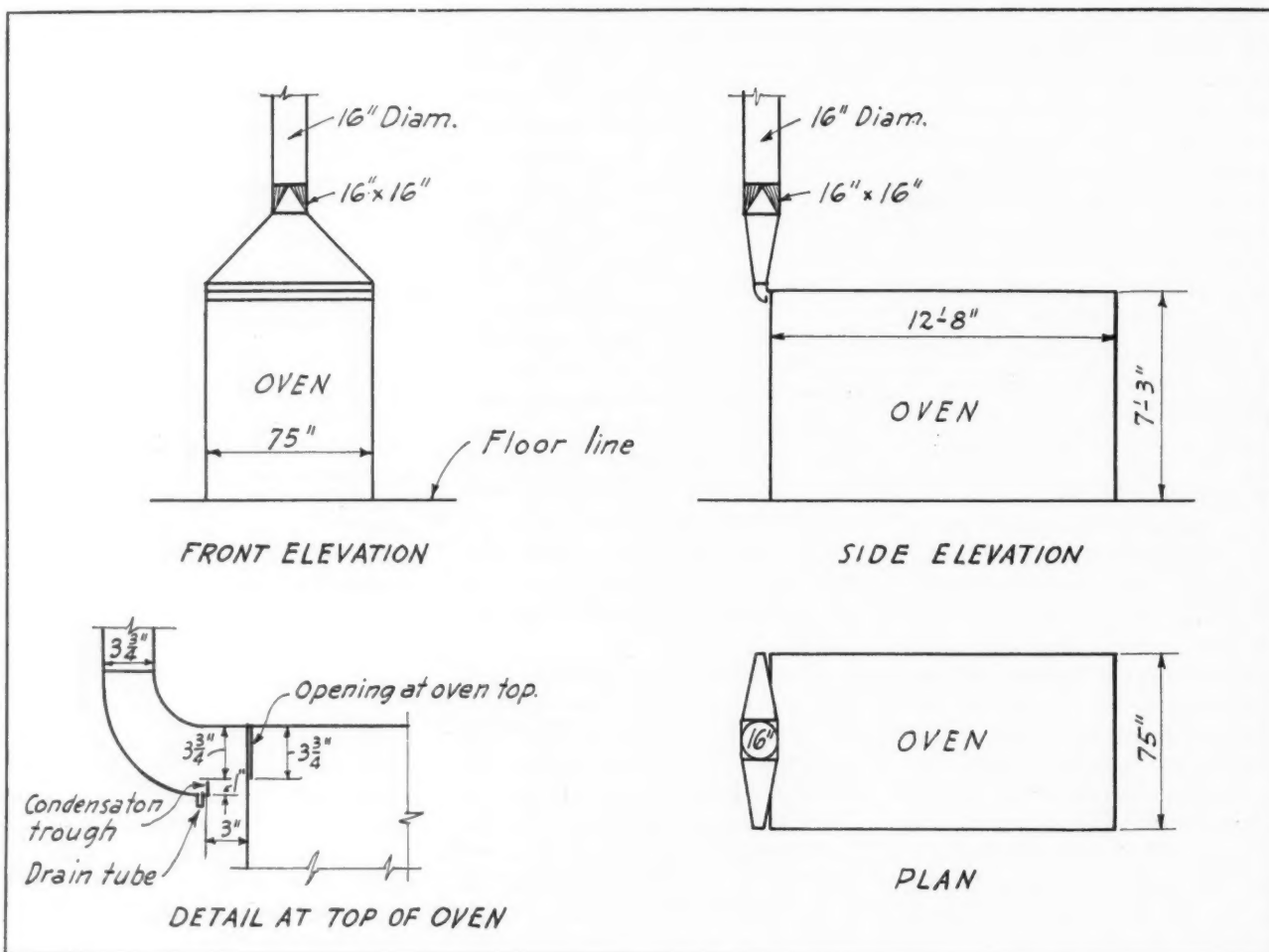
By R. F. Jeske
Milwaukee, Wis.

THE problem of removing vapor emanating from a steam baking oven proved to be an interesting subject as this paragraph will explain. This type of oven uses steam for bread baking and from an opening at the front top of oven, 75" wide by 3 $\frac{3}{4}$ " high, vapor and steam constantly emanates. This vapor and steam condenses on the ceiling walls and windows of the bakery and naturally proved to be a nuisance. The oven is located about in the center of a room 70 ft. by 50 ft. and 12 ft. high.

The proprietor of the bakery wrote to several ventilating firms and their answers for his problem were so varied and the methods suggested differed so decidedly, that the proprietor was puzzled. One fan and blower manufacturer suggested to use a propeller fan, 42" diameter wheel and having a capacity of 13,000 cfm, free air and which would produce an

air change every 3 $\frac{3}{4}$ minutes in the entire establishment. This fan was to be placed in a window or in the wall. The opinion of this manufacturer was so far from being the best way to solve the problem, as proven by the actual installation, that one wonders why more thought was not given the subject and more information asked from the bakery owner, before the fan manufacturer submitted his proposition.

Such a proposition would remove a tremendous amount of heat from the bakery by exhausting 13,000 cfm and requiring a one horse power motor compared to the actual installation, which is handling the job satisfactorily and at a very reasonable initial installation cost, and at only one-third of the monthly electric current cost as compared to this manufacturers proposition. In addition, this method



of placing a propeller fan in an outside wall or a window, would not remedy the nuisance, as the vapors would still enter the establishment and before being drawn out by the fan, would condense on ceiling and walls, leaving a "mess" as before.

Actual Installation

A propeller fan could be used with a capacity equal to the air delivery at about $\frac{1}{4}$ " S. P. as per the following data, provided the fan would not be too noisy to disturb the neighbors, the bakery being a residential area. In this case a blower of No. 2 $\frac{1}{2}$ size was used, delivering 2,000 cfm, against $\frac{3}{16}$ " S.P. and requiring a $\frac{1}{3}$ H.P. motor. Referring to the drawings note the location of the oven opening from which the vapor emanates. To this opening was connected the mouth or inlet of the exhaust duct, size 75" x 3 $\frac{3}{4}$ ", but note that it was not connected tight to the oven, but was kept away about three inches at the bottom. This was done in order not to take too much heat from the oven and to let air enter the intake without adding oven resistance to the system.

The duct inlet at size given has 282 square inches or 1.95 square feet area and has an entrance velocity of about 1,000 fpm, which effectively removes the vapors. The exhaust duct leading to blower was made 16" diameter, having 1.4 square feet area, with

a resultant duct velocity of about 1,430 fpm. This duct velocity was held to eliminate some condensation of vapors in the duct, as at a lower velocity more condensation would take place in the pipe. Duct from blower to outside was also made 16" diameter. The system removes the vapors so thoroughly that not any vapor enters the bake shop.

Condensation in System

In all installations of this type the sheet metal contractor must consider the condensation of vapors taking place in the system. Never construct a job that will have condensed water leaking out of every joint, eventually streaking the pipe and causing water pools or spots on the floors, etc. All pipe, etc., should slope upward in direction of air flow and all joints should be lapped contrary to air flow and should be soldered tight, so as to conduct the condensed water back to drain trough of hood and from there by means of a tube or a very small conductor pipe, to the sewer or some receptacle which can be emptied occasionally. If it is more convenient to take the drain from the other or discharge end of systems, then of course the slope of pipe and the seams should be reversed. But in all cases of a suction system, all joints not grooved must be soldered to prevent air leakage.

Fiberglas Manufacture (Continued from page 23)

"Staple Fiber" Method

In the staple process, the molten marbles are forced downward through tiny holes of the same type of costly metal bushing, but instead of being "drawn," as in the continuous process, they are blown downward by steam under high pressure.

Passing through a burst of glass flame to eliminate moisture, the fibers gather upon and are drawn from a revolving drum. White as snow, the accumulation or "sliver" follows grooved wheels to be wound on swiftly revolving spools. These are taken to ordinary textile spinning machines for twisting and reduction to thread for fabrication.

Fiberglas as Filtration Medium

In the present-day chemical industry there is an imperative need for highly resistant filtering materials to separate solids from liquids. In the process industries, a great many of the operations entail the use of heat or acid.

There have never been suitable cloths to be used as a filtering medium under the acid or temperature conditions ordinarily encountered. Wool, cotton, rayon, paper, human hair—a wide variety of materials—have all been tested and are used under certain conditions in the process industries, but none of them have good characteristics under acid conditions or under high temperature. The most commonly used material will only stand a temperature of 200 to 250 deg. F. Another will stand a temperature of 300 deg., and human hair will stand approximately the same.

None of these materials will last any length of

time if subjected to very strong acid conditions.

Fiberglas cloths are now being developed that will have as high a filtering efficiency as any of the materials now in use, and will withstand temperatures of 600 to 700 deg. F. and can be used in concentrated solutions of all acid except hydrofluoric.

These cloths are strong, durable and can be applied and handled in just the same way as ordinary materials. In addition, they do not swell when wet and their filtration characteristics remain the same over extended periods of time.

Kitchens and Battleships Insulated Alike

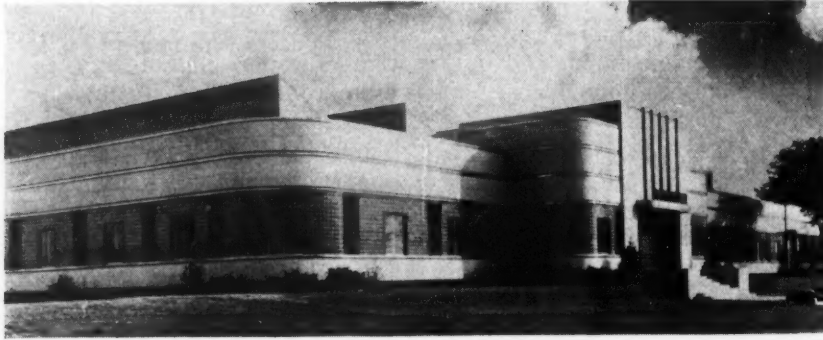
Today's housewife can have her kitchen insulated exactly the same way battleships are—with snow-white mats of Fiberglas.

Her domestic workshop can have a gas or electric range insulated with glass to keep the heat in for more efficient cooking and a cooler kitchen; an electric refrigerator insulated with the fire, vermin and moisture-proof material to keep the cold in.

In the housewife's basement, the hot water heater is now being insulated with the product.

In Newark, Ohio, the experts are working with Fiberglas in textile form to give the housewife of tomorrow a fire-proof table cloth of pure glass, draperies, doilies and—well, the possibilities are fascinating.

Already, they can provide her with fire-proof and water-proof wall paper made of lustrous Fiberglas cloth, with weaves that offer delightful new ideas in decoration.



The Armco Research Laboratory

THE new research laboratory of the American Rolling Mill Company, dedicated with impressive ceremonies in the presence of scientists from all parts of the country on November 5, in Middletown, Ohio, is one of the most modern structures erected in 1937. Tradition breaking in design, and unique in the use of new and old materials, this building designed by architect Harold Goetz, of Middletown, and erected by the Austin Company, presents the colorful harmony and practicability of stainless steel, porcelain enameled iron, glass block and pre-welded panel construction.

The building has a frontage of 255 feet and a depth of 175 feet, providing 43,500 square feet of floor space. It is a sawtooth type with welded steel frame construction of new design. Not a rivet was driven in the structure.

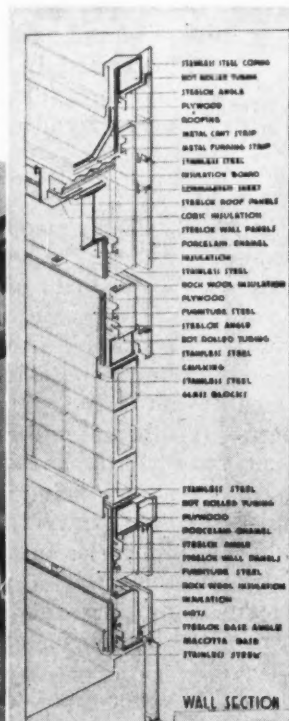
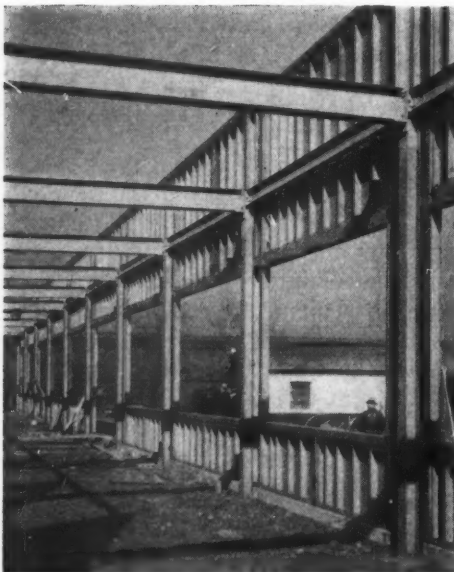
A solid concrete wall, four feet underground and one foot above, forms the foundation. It is 9½"

wide at the base and tapers to 5½" at the top. Structural steel is anchored to concrete piers.

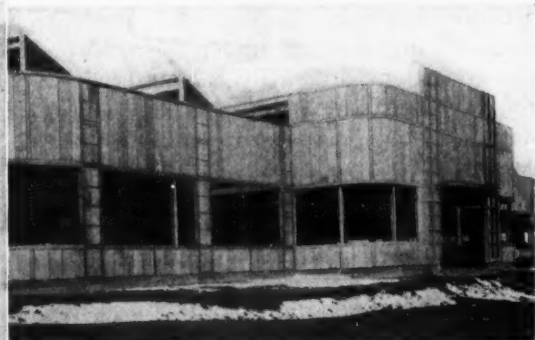
Structural steel framework and bent beams for the sawtooth roof were largely pre-welded in the shop to keep field welding to a minimum.

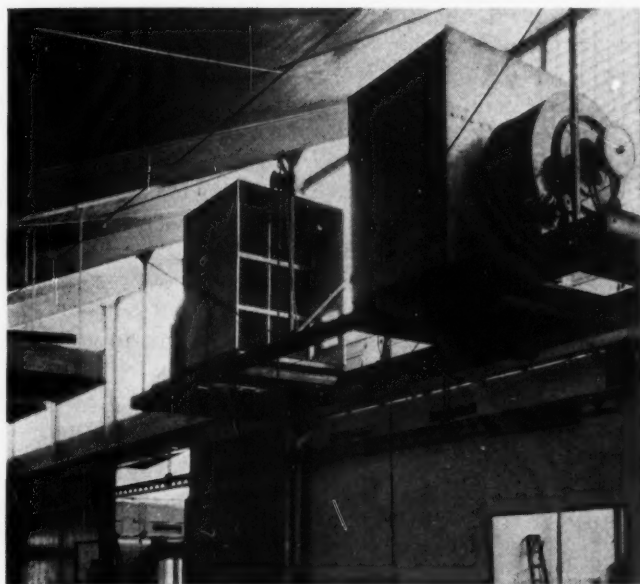
The building takes advantage of north light and reduces heating and maintenance expense, since the vertical surface of glass block has high insulating properties and constitutes a self-washing surface, in contrast to sloping sawteeth where a 25 per cent loss of light is frequently encountered if the glass is not washed once a month or oftener.

Seven sawtooth faces extend over the width of the laboratory section of the building. Each sawtooth section has an area of 10 glass panels, with an area 10' 4" by 15'. The glass block, 5" by 8" and 4" thick, is supported in channels of the structural beams, with ¾ rod X-type wind bracings. The method of installation facilitates air-conditioning and



Above—Exterior showing main entrance. Below, left—inside wall construction (insulation added later). Center—Cross section of wall showing panels. Right—Outside walls ready for porcelain enamel face sheets.





Left—Two conditioning units in sawtooth. Each unit has coils and fans. Right—Duct work before concealment. Supply above breathing level; return at floor.

eliminates the danger of leakage frequently encountered in sloping sash as a result of expansion and contraction.

Roof and Ceiling Construction

Steelex metal roof panels are 18-gauge galvanized iron, with a five-inch web on nine-inch centers, spanning 15 feet from girder to girder. For acoustical purposes, the metal ceilings of the offices are perforated with about ten 3/32-inch diameter holes for every square inch of surface. The end of each panel is spot-welded to the center of the girder. Pitch of the roof is six inches for every twelve feet of horizontal run.

Acoustical cork inside the perforated ceiling panels rests on 1-inch metal chairs welded in the center and at the ends of each panel. On top of the cork, 26-gauge galvanized corrugated iron sheets, with 1/2-inch corrugations, run at right angles to the web members.

The corrugated iron is covered with 1-inch insulating cork, fastened down with helical sheet metal nails. To cover the cork, an asphalt material was used in the sawtooth slopes. Tar and gravel were utilized in the valleys and flat decks.

Roof drainage is provided by metal roof sumps which drain into four- and five-inch downspout lines running down structural columns into the underground sewer system. Roof boxes are 12 inches square. Corrugated iron metal saddles on top of the roof deck give a proportionate flow to each downspout.

Exterior walls rest on a concrete floor slab which is integral with the building foundation. Three of the exterior elevations are faced with combinations of porcelain enameled iron sheets, stainless steel and glass block. They are formed with 13.6 pound 4-inch square metal tubing, which provides the skeleton for outside walls.

Horizontal metal tubes are welded beneath the

window sills and above the glass block. Two vertical tubes in each pilaster are fastened to the foundation with anchor bolts. All tubes are welded to the structural frame.

Wall Construction

Steelex channel sections, manufactured by Steel Buildings, Inc., an Armco subsidiary, form the nucleus of the wall sections. In all sections except at the glass block openings, 20-gauge galvanized Steelex panels, with flanges facing inward, are bolted to the framework. Each section has a three-inch channel filled with an insulating material. The channels are covered with one-inch square continuous hollow metal furring strips, welded to the Steelex webs. Interior walls of the laboratory section are covered with 22-gauge flat steel sheets, painted in two shades of gray.

For the exterior facings, porcelain enameled panels are fastened to the Steelex wall sections with metal girt strips formed in the shape of a hook. The water table base is of black enameled iron, which is concrete filled and has stainless steel trim at the joints.

Immediately above are cream-colored porcelain enameled iron panels, 2 feet 7 3/4 inches high. These were clipped to the girt strips and caulked. Four-inch bands of stainless steel, forming the cornice, belt course, window sill and head lintel above the glass block were also clipped on in similar fashion. Stainless steel one-inch wide also frames fixed plate glass windows inset in the glass block panels which, with the black porcelain pilasters, form a continuous band around the building. V-shaped vertical segment strips, also of stainless, provide contrast in the central two-story tower at the principal facade.

Above the second four-inch band of stainless steel are two rows of cream-colored porcelain enameled panels, each 3 feet 5 1/2 inches high. These sections, too, are separated by a stainless steel band.

The Steelox panels have been filled with an insulating material and covered on the inside with 18-gauge walnut-finished furniture steel, except in sections where rough shop work dictated the use of painted sheet steel.

The rear wall, sawtooth gables and most of the partitions in the laboratory section are of the insulated steel wall, developed by the Insulated Steel Construction Co. The wall is formed of two thicknesses of light gauge sheet steel, filled with a special mineral product similar to mica which possesses high sound proofing and insulating qualities. The same material has been used in the flooring in the small second-story tower above the entrance lobby. It rests on a welded box-type floor 5 inches thick, which spans an area 18 feet wide.

Air Conditioning

Ventilation and atmospheric conditions are controlled by two air-conditioning systems, one for the research staff offices and one for the testing shops and laboratories. There are five units, two of which provide zone control for northern and western exposures. The laboratory section is conditioned by three units, each providing zone control in a self-contained group of rooms. These are supplemented by fume and heat exhaust systems in chemical laboratories.

Deep well water is used for summer cooling. It is pumped into the system at a rate of 400 gpm and pressure of 50 pounds a square inch. Summer maximum temperature of the water will be 60 degrees F. at the point of entrance to the building.

Each unit is suspended on a structural steel sub-base extending completely under the face and by-pass dampers, the cooling coil, the heating coil, the fan and motor. The units are cased in galvanized Armco Ingot Iron. Supply and return air ducts to all parts of the building are made of 24 and 22 gauge galvanized Armco Ingot Iron.

Fresh air intakes are set in the glass block sawtooth walls, and conditioned air is supplied to rooms through diffusing grilles placed near ceilings. In summer warm air is recirculated from rooms through diffusing grilles placed near ceilings. In summer warm air is recirculated from rooms through grilles near the floor.

All units are located overhead in the peaks of the sawtooth roof to provide ample clearance for testing machinery. All horizontal duct work is run overhead, flush with partitions or structural members so as to be quite inconspicuous.

The office units are designed to maintain a summer dry-bulb temperature of 80 degrees F., with a relative humidity not exceeding 50%, and a winter dry-bulb temperature of 70 degrees F., with a relative humidity of 30%. Because of the highly insulated wall and roof construction, the relative humidity in winter is considerably above that for the average building.

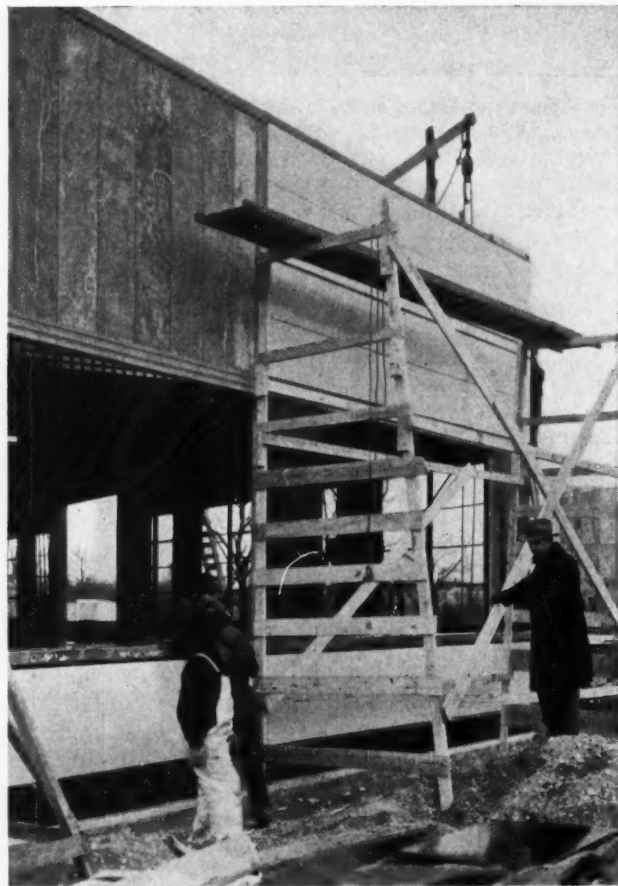
Each unit has a single inlet, single width, full housed, low speed multi-blade fan, with forward curved blades, a V-belt fan drive and a squirrel

cage open type ball bearing motor and base. There are rubber vibration dampers between the fan, motor and structural steel sub-base.

Cooling coils on all units have six rows of finned tubing designed for a test pressure of 200 pounds per square inch, and an air velocity of not more than 450 feet per minute over the face area of the coil. The coils are designed to permit the efficient use of the cooling water in strict counter-flow to the air.

Heating coils are of the same general construction as the cooling coils. They are designed for test pressure of 150 pounds.

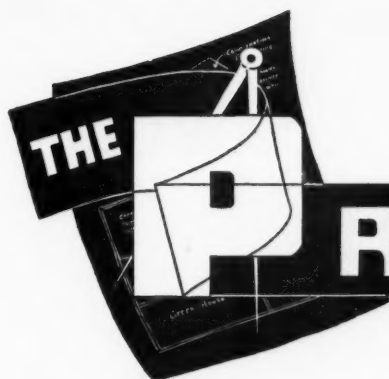
During the cooling cycle the positions of the face and by-pass damper over the cooling coil are controlled by the instruments in the return air arranged



Porcelain enamel sheets being applied to Steelox panels.

to provide a high limit on dry bulb, a high limit on relative humidity and a low limit on dry bulb in the event the machine is being operated for dehumidification. The modulating damper motor is provided with an auxiliary switch, which closes the water valve supplying the cooling coil whenever the cooling by-pass is in the full open position. A relay in the control circuit closes the water valve whenever the fan on its system is not in operation.

Steam for heating the laboratories is obtained from a 120 lb. per square inch main, and is reduced to low pressure, from 5 to 7 lbs. to serve the five air conditioning units.



Your comment or experience is invited.

PROBLEM CORNER

Register Dirt

American Artisan:

Enclosed is a sketch of a house heating system in which we are experiencing trouble with dirt issuing from the registers. This is a new house in which the system pictured was installed last fall. So far as heat is concerned, the system is more than satisfactory, but the registers in every room, except the living room (which is 21 inches lower than all other



PLAN

Room	C.C.	Glass	Wall	Cfm.	R.B.F.
Living	2200	60	222	208	16.9
Bed Rm. 1	1140	55	154	149	12.1
Bath	350	12	33	40	3.2
Bed Rm. 2	1470	40	212	130	10.6
Dining	1890	26	100	119	9.7
Kitchen	1125	40	290	141	11.5
				787	64.0

Register Temp. 140 F
F.p.m. 500
Furnace stat in Plenum
set at 165 F
(No thermostat,
hand fired coal)

Blower rated 1300 cfm
12" " wheel
10" " pulley
3" Filters
Air washer louvers W.
shaped, spaced 1/2" apart.
1/4 hp. motor, adj. pulley.

first floor rooms) are passing black dirt which is playing havoc with the decorations.

There are three filter sections which should catch all dirt passing through the blower. Note also that there is a washer used with the blower, which should add further to the cleaning ability of the system. So far as we can judge the system is absolutely tight all the way through.

H. D. W., Georgia.

A Reader Suggests—

I have been studying the problem submitted by H. D. W., of Georgia, in the November issue of American Artisan. It seems to me his main trouble lies between the air washer and the plenum chamber. Any dust or dirt entering into the

cold air pipe before going into the blower would be removed by filters and an air washer.

In all probability, the system was used for summer cooling, necessitating the use of an air washer without the heat from the furnace. Since a cast furnace was used, the moisture collected on the castings. Consequently, the cement in the joints became loose and turned to a fine dust, which was, in turn, passed into heating pipe together with escaping smoke from the furnace.

I would advise H. D. W. to remove the middle casing, which would require only a few hours' time, and recement the joints—especially around the feed pouch and the ash pit.

I recommend, also, the use of a steel furnace, with crescent radiator, as there are fewer joints; also, they can be had with asbestos packing instead of cement, thus eliminating the danger of loose joints.

John Wetzel, Carlinville, Ill.

Oily Filament at Registers

American Artisan:

We have installed two stokers in warm air furnaces to which have been added blower-filter units. Since installing the blower units there seems to be an oily filament which settles on the registers. Curtains or drapes near registers become black as coal. Could this oily substance come from the filters which are spun glass coated with oil?

F. S. K., Indiana.

Reply by The Editors

The oily material sounds as though it is unburned oil content of a highly volatile coal, and since there are numerous coal mines producing coal of this type in Indiana, we suggest that you obtain an analysis of the coal used from the dealer, and if this shows a highly volatile characteristic, recommend the owner changing fuels at least for the time required to burn one ton. We also suggest that you check the furnace for gas tightness especially if the furnace is cast iron and has not been reset for some years. There may be leaks in the casting joints indicating the need for recementing. If the furnace is steel, you should check the collar connection between combustion chamber and radiators.

Also there may be leaks around the hearth, which makes it possible for gases of combustion to leak out into the air chamber when the stoker first starts. If the chimney draft is not sufficient, the stoker fan will set up a pressure during the first part of the operating cycle and this pressure may be released through joints in the furnace until the chimney flow is established. We do not know of any other source of this oily material except the fuel used.

You do not state whether or not the fan has been installed recently, but if it has, we suggest that all pipes and stacks be very thoroughly cleaned by drawing burlap sacking both ways through the stack, as it frequently happens that gravity air flow deposits dirt which never comes out of the register until a fan is added. Oftentimes such dirt will continue to come from the register for several months after the fan is installed.

We suggest that you write to G. A. Voorhees, 633 South Delaware, Indianapolis, Indiana, and outline your problem and ask for suggestions.

A Plan of Bookkeeping Accounts

By Joseph G. Dingle

C. P. A., Ottawa, Ill.

IN the July 5, 1930, issue of the ARTISAN, we gave our readers a chart of accounts, and a rather full discussion of the uses and purposes of the several accounts named therein. Since that time we have had many inquiries concerning matters of bookkeeping, and the industry has undergone quite radical changes. The typical shop of 1930 has found it necessary to add new lines of merchandise, particularly appliances, and the operations require a revamping of the books to properly record these new transactions.

During recent months we have been discussing the problems facing the typical reader of the ARTISAN, and we now wish to present a new and revised CHART OF ACCOUNTS, and discuss the individual accounts, with the idea of enabling readers to make such changes in their book-keeping methods as may be found necessary or advisable at the turn of the year. In order to be more complete, we shall discuss these accounts as though all our readers were in need of book-keeping instruction. It will not hurt those who are already acquainted with modern book-keeping methods, and will be of more value to those who are beginners in the art.

Cash in Office

Every business must keep a change fund in the office, and in a great many offices, disbursements are made in cash for minor expenses. We recommend the establishing of a fixed petty cash fund (No. 1) and as expenditures are made from this fund, those expenditures are treated as "cash tickets" until a check is drawn to replenish the fund to its original amount; at which time the disbursements are, by means of the check reimbursing the petty cash fund, charged to the proper accounts affected by the disbursements. In the use of a petty cash fund in this manner, all receipts of cash are deposited in the bank and the accounting for cash funds is made much more complete and fool-proof.

Bank

This account (No. 2) is required by every business, sometimes several banks are used. It is to be charged with all deposits, and, if the petty cash fund be used as above recommended, the total deposits will be equal to the total cash receipts. Thus

the book-keeper will have an absolute check on the proper handling of cash receipts — a deposit total equal to the total receipts. As checks are drawn against the bank account, the account will be credited, and thus the balance in this account should at all times reconcile with the bank's balance, after allowing for outstanding checks.

In reconciling the bank account, the book-keeper should check off in her Cash Journal—not her check stub—the checks which have been paid and returned by the bank. Unpaid checks are not yet charged against the account by the bank, therefore the bank's balance at the close of a given period will be greater than the ledger balance in BANK account in an amount equal to the outstanding, or unpaid checks. Again, there may be deposits in transit—that is, the books may show that the cash receipts of the last day of the month are deposited, yet the bank statement will not show this deposit until the first of the new month, therefore, this deposit would be "in transit" at the close of the month. Checks should be numbered consecutively, and in entering the checks in the Cash Journal, these check numbers should be shown and accounted for. Spoiled checks should be shown, as to number, in the cash journal, with the notation "spoiled" in the description column.

Accounts Receivable

This account (No. 3) is to be a controlling account, representing, in total, the month's transactions, both as to charges and credits, and will show at all times the aggregate amount of Accounts Receivable outstanding. In a subsidiary ledger will be kept detailed accounts with each customer, which will show the charges and credits in his account, and all these accounts in the subsidiary ledger should be reconciled with the control account at the close of each month.

Notes Receivable

This account (No. 4) is raised to contain notes taken from customers, and if there be a large number of notes, it might be well to use a detailed list or note register, which should be kept in reconciliation with this account. One of the most common mistakes of book-keepers is to credit both principal and interest payments to Notes Receivable account,

while only principal payments should be so credited—the interest paid being credited to Interest Earned.

Investments

This account (No. 5) is raised to contain investments in Stocks or Bonds, or other securities, and is not to be confused with either the inventory accounts or the equipment accounts.

Inventory—Materials

This account (No. 6) is raised to contain the opening inventory of materials, or merchandise, as differentiated from appliances or supplies, specific accounts for which have been provided. As purchases are made of materials, their cost will be charged here, and as materials are withdrawn for use in Work in Progress, or for sale, the account will be credited with such withdrawals at cost, with the corresponding charge going to either Work in Progress, or Cost of Sales Materials, as the case may be. At the end of the year, when the inventory of materials has been taken and priced, any difference between the physical inventory and this account will be adjusted by debiting or crediting "Cost of Sales—Materials."

Inventory—Appliances

This account (No. 7) is raised to contain the purchases of appliances—which are purchased as a complete unit ready for sale or installation in the shape purchased. We have raised suitable accounts for the sales of appliances, cost of sales-appliance, etc., and believe it will be found of material benefit to segregate sales of materials and sales of appliances, as they represent two quite different products.

Inventory—Supplies

This account (No. 8) is to contain supplies such as are used in the carrying on of the business, but rarely sold as such. Of course, in estimating a job, provision is made for solder, bolts, rivets, etc., and when computing the cost of

Assets

1. Cash in Office
2. Bank
3. Accounts Receivable
4. Notes Receivable
5. Investments
6. Inventory—Materials
7. Inventory—Appliances
8. Inventory—Supplies
9. Consigned Merchandise
10. Work in Progress
21. Machinery & Equipment
22. Delivery Equipment
23. Furniture & Fixtures
31. Proprietor's or Partners' Drawing Accounts
41. Deposits—Franchise
42. Prepaid Insurance

Liabilities

51. Accounts Payable
52. Notes Payable
53. Notes Receivable Discounted
54. Consignment
61. Accrued Wages
62. Accrued Taxes, Real Estate & Personal
63. Accrued Taxes, Old Age Benefits
64. Accrued Taxes, Unemploy. Comp. Fed.
65. Accrued Taxes, Unemploy. Comp. State
66. Accrued Interest
67. Accrued Liability Insurance
68. Accrued Workmen's Comp. Insurance
71. Reserve for Depreciation—Mchy. & Eqpt.
72. Reserve for Depreciation—Delivery Eqpt.
73. Reserve for Depreciation—Furn. & Fix.

Capital Accounts

81. One account if individually owned. Separate accounts for each partner if partnership.
- Capital Stock and Surplus, if corporation.

Income

101. Sales—Material
102. Sales—Labor
103. Sales—Appliances
104. Sales Appliances Wholesale
111. Cost of Sales—Material
112. Cost of Sales—Labor
113. Cost of Sales—Appliances
114. Cost of Sales—Appliances Whol.
121. Returns & Allowances—Material
122. Returns & Allowances—Labor
123. Returns & Allowances—Appliances
124. Returns & Allowances—App. Whol.
131. Discount Taken
132. Interest Earned
133. Commissions Earned

Expenses

141. Advertising
142. Bad Debts
143. Collection Expense
144. Discount Allowed
145. Delivery Expense
146. Depreciation
147. Dues & Subscriptions
148. Freight & Drayage
149. Heat, Light & Water
150. Interest Paid
151. Insurance—Fire
152. Insurance—Liability
153. Insurance—Workmen's Comp.
154. Indirect Labor
155. Machine & Tool Expense
156. Office Expense
157. Rent
158. Repairs—Delivery Equipment
159. Repairs—Show
160. Salaries—Office
161. Salaries—Selling
162. Selling Expenses
163. Taxes—Real Estate & Personal
164. Taxes—Income
165. Taxes—Old Age Benefits
166. Taxes—Unemploy. Comp.
167. Telephone & Telegraph
168. Traveling Expense

such a contract, it would be well to credit supplies inventory and charge Cost of Sales—Material with the estimated amount of supplies used in the completion of the job. At the close of the year, a physical inventory should be taken of supplies on hand, and the inventory account adjusted to that inventory, with the corresponding entry to Cost of Sales of Materials.

Consigned Merchandise

With the growing tendency of the trade to take on the franchises of manufacturers of appliances, many of the manufacturers are placing demonstrators or samples with the dealers on consignment. When such merchandise is received, it is usually covered by an invoice or memorandum billing. The dealer should enter that memorandum billing by charging "Consigned Merchandise" (No. 9) and crediting "Consignment" account. This entry will bring on to the dealer's books the amount of such merchandise he has on hand belonging to others, and the same amount will also appear as a liability in the "Consignment" account. Then, as consigned merchandise is sold, an entry should be made to reverse such transaction—that is, a charge against Consignment and a credit against Consigned Merchandise—and then the manufacturer's invoice will be entered as a purchase invoice, debiting inventory account and crediting accounts payable, or notes payable, as the case may be.

Machinery and Equipment

This account (No. 21) is raised to contain the cost of the machinery and equipment owned by the business, and will be charged with new equipment as acquired, at cost. Attention is called to the account Reserve for Depreciation—Machinery & Equipment, which is to be credited with the monthly or annual depreciation as charged into expense to represent the inclusion in expense of the wasting value of the investment.

Delivery Equipment

This account (No. 22) is raised to contain the cost of delivery equipment, which, as a rule, depreciates much faster than does Machinery and Equipment. Salesmen's automobiles might well be included in this account, as the usable life of a car is quite comparable with that of a truck.

Furniture and Fixtures

This account (No. 23) is to contain the cost of Office Furniture and Fixtures, also show room fixtures, and for these items, this account will be used as are the two accounts next above.

Proprietor's or Partners' Drawing Accounts

This account, or these accounts, (No. 31) are to contain the drawings of the proprietor or partners, as the case may be, and are not to be considered as expense of the business, as the drawings of the proprietor or the partners do not constitute expenses of the business for either profit purposes or for income tax computations.

Deposits—Franchise

Frequently, a manufacturer will require a dealer to make a cash deposit in order to acquire a franchise. Such a deposit is not a purchase, rather a guarantee of good faith, and upon surrender of the franchise, the amount is refundable to the dealer. Such deposits are to be charged to this account (No. 41), there to remain until either forfeited or returned.

Prepaid Insurance

Insurance premiums are charged for the life of the policy, and are usually for one or more years. Upon payment of this premium, there is an element of prepaid insurance (No. 42) and each month there should be a charge to insurance expense, with corresponding credit to Prepaid Insurance, thus charging into expense the premium during the life of the policy. Assume a policy carrying a premium of \$36.00, and running for three years. One-thirty-sixth of \$36.00 would be the monthly cost of this insurance, therefore the monthly charge to insurance would be \$1.00, with corresponding credit to this account and at the end of the three years, the entire amount would have been charged to expense. If insurance be charged annually instead of monthly, at the close of the first year, \$12.00 would be credited here and charged to expense, and similar entries for the second and third years would wipe out the prepaid insurance. Each policy should be treated in this manner, thereby keeping the account in reconciliation with the actual prepaid premiums.

Accounts Payable

This account (No. 51) will be credited with the purchase and expense invoices as received, and when paid, charge will be made against this ac-

count. Like Accounts Receivable, there should be a subsidiary ledger to contain separate accounts with each creditor, and the aggregate of these creditor accounts should be kept in reconciliation with this controlling account.

Notes Payable

This account (No. 52) will be used to contain liability for notes given in payment of purchases, or for borrowed money. As payments are made on notes payable, proper charge will be made against this account, and the balance should at all times reflect the actual amount owing on notes outstanding.

Notes Receivable Discounted

With the sale of appliances, there is the custom of closing the account with a series of notes, which quite frequently the dealer will discount with the manufacturer, or with a finance company. The usual practice is to sell these notes with recourse—that is, the dealer agrees to take them back if they are not paid when due. Upon the sale of the notes to the finance company, the entry will be to debit cash, or bank, and credit NOTES RECEIVABLE DISCOUNTED, (No. 53) rather than NOTES RECEIVABLE, because the dealer is still responsible for the payment of the notes so discounted or sold, and his liability is shown in this NOTES RECEIVABLE DISCOUNTED account. As payments are made on the discounted notes by the maker, the dealer should debit NOTES RECEIVABLE DISCOUNTED, to reduce the contingent liability, and credit NOTES RECEIVABLE, to indicate the reduction in the amount of notes receivable. Notes Receivable Discounted should be reconciled at frequent intervals in order to avoid having the account get out of line on account of payment of notes direct to the finance company by the makers of the notes.

Consignment

This account (No. 54) is the off-setting account for the CONSIGNED MERCHANDISE account, and its operation was discussed in the prior account.

Accrued Wages

In order that the books may be permitted to show accurate operation conditions at the close of each month, also to bring the pay roll on to the books for the purpose of the OLD AGE BENEFITS AND UNEMPLOYMENT COMPENSATION taxes, this account (No. 61) is raised. By charging the unpaid wages at the end of the month to the proper labor and salary accounts, with corresponding credit to this account, it will be easier to compute the month's obligation for the pay roll taxes, also for pay roll insurance, and, when paying the wages so brought into accrued wages, the charge will be to this account, rather than to the usual wage accounts.

(Continued on page 86)



DEVOTED



RESIDENTIAL AIR CONDITIONING SECTION

THIS December Air Conditioning Section marks six years of continuous attention to the problems of residential and small commercial air conditioning.

- - - In every issue of American Artisan since January, 1932, there has been an Air Conditioning Section within the covers of which timely helps have been offered.

- - - American Artisan is proud of this service. This section was the first effort to bring together facts pertaining to residential air conditioning. On the pages of this section during these six years, some of the country's best known air conditioning authorities have contributed articles.

- - - During these six years every possible phase or angle of residential air conditioning has been probed by authorities assigned individual problems or complete subjects for serial discussion. The progress of American Artisan's Air Conditioning Section closely reflects the advancing thought of this truly great contribution to human comfort.

WATERLOO

Air Conditioning REGISTERS

More Profits for YOU Next Year

—with the larger
sales this line
gives you

In 1937 Waterloo Air Conditioning Registers gave hundreds of dealers one of their best register seasons. But an even better year's beginning, as builders and contractors' preference for these beautiful "Venetian blind effect" registers steadily increases. No other register line offers such modern beauty, smartness, such complete harmony with modern building styles. Waterloo's distinctive straight-line simplicity of design is **EXCLUSIVE WITH WATERLOO**. And so are such mechanical advantages as—

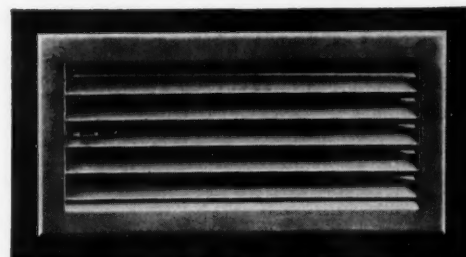
Slanted louvers which reflect light and color, conceal the ducts—Complete adjustable control of air flow (90-degree range)—Positive lock mechanism—Tested capacities.

Waterloo Register Co.

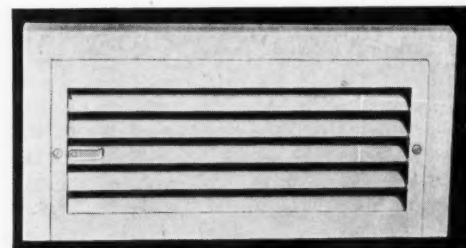
Floor Registers . . . Floor Cold Air Faces
Baseboard Gravity Registers
Wall Registers . . . Oakwood Faces
Steel Grilles . . . And All Furnace Supplies

Waterloo, Iowa • Seattle, Wash.

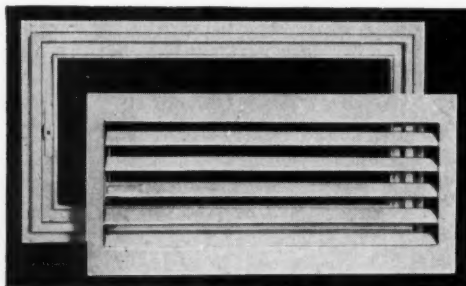
In New York City — Air Conditioning Utilities Co., 8 W. 40th St.
In Los Angeles, California — Waterloo Register Co., 824 Clanton Street.



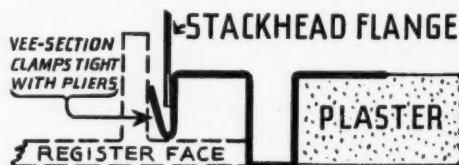
FH-100 Adjustable one-piece Venetian Type Register for walls.



FHD-204—Two-piece Venetian type adjustable Register for baseboards.



FH-102—Venetian Type adjustable Register for walls, with Vee-U plaster frame.



The Waterloo Vee-U Frame assures positive, tight connection with stack-head.

**MAIL
THIS
COUPON
NOW!**

Waterloo Register Company
(Address nearest office or agency—see list above)

Send new catalog of Waterloo Registers, with new designs, new charts and installation data—without obligation.

Name

Firm

Address..... City.....

Apply this

MEASURING STICK TO YOUR TERRITORY

Build Business with TRANE CLIMATE CHANGER

*Light!
Compact!*



TRANE CLIMATE CHANGER

*Cools · Cleans · Dries in Summer
Warms · Cleans · Humidifies
in Winter*

TRANE

THE TRANE COMPANY, LA CROSSE, WISCONSIN . . . 70 U. S. OFFICES
TRANE COMPANY OF CANADA LIMITED, TORONTO, ONTARIO
Heating · Cooling · Ventilating

WE say with confidence that you can increase your business substantially with the Trane Climate Changer, because of three established facts, evidenced by hundreds of installations available to you for proof.

1. Trane Climate Changer can be installed for winter heating and humidification, for year 'round air conditioning, or for summer cooling. The job determines the size unit, the system, and the application.
2. Trane Climate Changers, because of their wide capacity range and because they handle ANY OR ALL PHASES of Heating or Air Conditioning, will place you in position to obtain larger, more profitable jobs.
3. Trane Climate Changers are easy to figure and install. They are designed to operate with other Trane Related Heating or Air Conditioning units.

Get into REAL air conditioning the easy and profitable Trane Climate Changer way. Sell "Trained Air."

*Easy to
Install*

MAIL THIS TODAY!

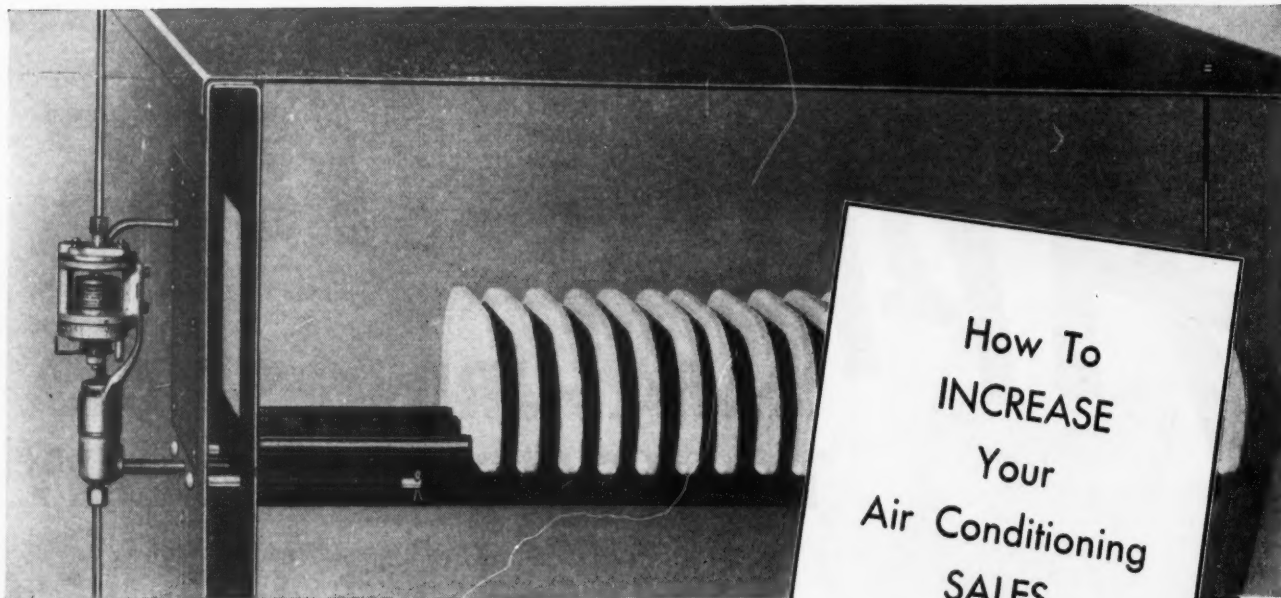
TRANE-O-GRAM

The Trane Company, 2007 Cameron Ave., LaCrosse, Wis.
I want all the facts on Trane Climate Changer. Tell me
how I can increase my profits and installations.

Name.....

State.....

City.....



This Book...
shows the way to
PROFITABLE
WINTER BUSINESS
Send for Your Free Copy Today

Furnace and Air Conditioning Dealers: You can make good money selling Automatic June Humidifying Systems this winter. Winter time is air conditioning time — and the best time to sell humidification, for then home owners are suffering from lack of humidification or mopping up streaming windows caused by over-humidification.

With Automatic June you can sell the benefits of correct humidification at all times. It is governed by weather conditions, and graduates the supply of humidity accordingly.



This book is packed from cover to cover with sales sense and air conditioning selling ideas. It shows you how to make money. Now, and next month and the next. It tells what, where and how. Send for your copy today — It's free.

MONMOUTH PRODUCTS CO.
1933 E. 61st St., Cleveland, Ohio

AUTOMATIC

HYDRO-METRIC HUMIDIFYING



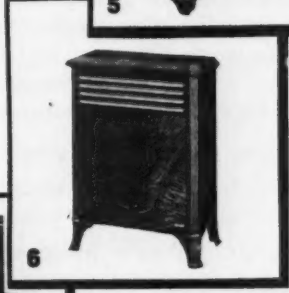
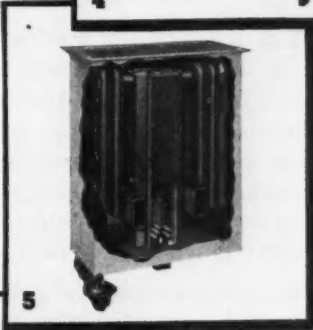
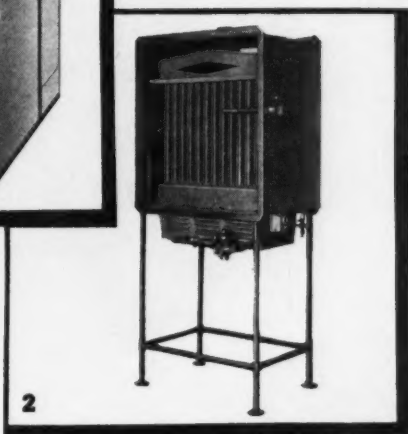
JUNE

SYSTEMS

From **LARGEST** to **SMALLEST**

Pacific Makes the Most Complete Line of Gas Heating Appliances

For every industrial, commercial and residential heating requirement . . . for every climate from sub-arctic to sub-tropical . . . for natural or butane gas, there's a Pacific gas heating appliance that will give greater satisfaction and show a lower operating cost. Pacific pioneering is responsible for many outstanding developments in gas heating practice, including the Safety Pilot and the Multi-Tubular Burner. You can always depend on Pacific for dependable service. Write for catalog AA12.



- 1 PACIFIC STREAMLINE DE LUXE**
Completely automatic forced-air heating and ventilating. Streamline casing furnished in attractive crackle finish with chromium trim. All controls completely enclosed.
- 2 PACIFIC DUCT UNIT**
Designed for duct work on commercial, industrial and residential installations. Capacities from 55,000 to 300,000 BTU. Can be coordinated with summer cooling equipment to give year 'round air conditioning.
- 3 PACIFIC FORCED-AIR UNIT**
Winter heating and summer ventilating in one compact, highly efficient unit. No basement required.
- 4 PACIFIC GRAVITY FURNACE**
The basement type of warm air furnace is one of the most popular in the Pacific line. Thousands in successful use for many years.
- 5 PACIFIC FLOOR FURNACE**
Circulates fresh warm air to every corner, giving even temperature so necessary for health and well-being. Eliminates damp, sweaty walls. Operates with extreme economy because of Pacific's famous Multi-Tubular Burner.
- 6 PACIFIC THERMOLATOR**
One of the most efficient room heaters ever devised. Exclusive cast iron heating element "holds heat" longer. Vented and unvented types.
- 7 PACIFIC RADIANT HEATER**
Pacific manufactures a wide variety of radiant heaters, both wall and portable types. Individual burner units permanently adjusted at the factory.

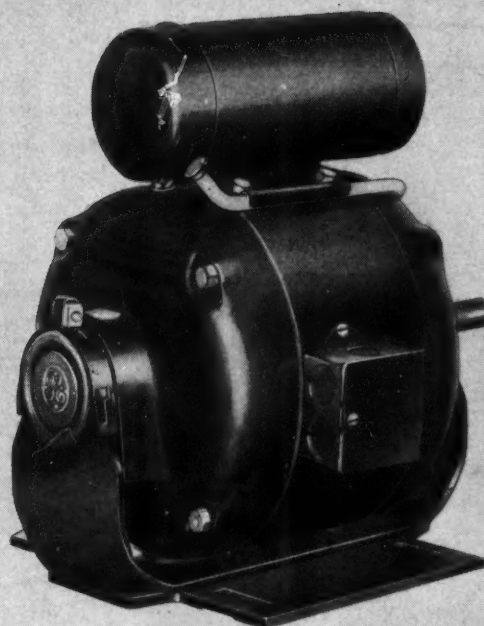
**PACIFIC
GAS RADIATOR
COMPANY**

1740 WEST WASHINGTON BLVD., LOS ANGELES, CALIFORNIA

TWO FOR THE PRICE OF ONE



"It's high-quality electrically, too — It's equipped with G-E motors."



A PRACTICAL SALES AID

A RELIABLE MOTOR

A G-E motor on the heating and air-conditioning equipment you sell is assurance—at a glance—to prospects that the electric apparatus is of high quality. They know, either from their experience or from that of friends, that G-E motors for stokers, refrigerators, fans, and other appliances are long-lived and dependable. General Electric is a company in which they have confidence.

Add this reputation of the motor to that of your heating and air-conditioning equipment, and you have a solid sales front. Thus you can devote more time to increasing sales by emphasizing the benefits of modern heating and air conditioning.

Moreover, the long, trouble-free service for which G-E motors are famous helps keep your customers sold on the equipment you sell—a sure way of getting new business and bringing back customers for additional installations. General Electric, Schenectady, N. Y.



THESE motors operate quietly and efficiently, require little or no attention, and give long, care-free service; they are designed, by experienced engineers, especially for heating and air-conditioning applications. Here are a few of their many *plus* features:

Cast-aluminum rotor winding—a one-piece pressure casting that cannot become open-circuited or burn out. Inherently well balanced.

Large oil-storage capacity—oiling is required but once a year.

Long bearing life—wool yarn and oil throwers keep the bearings always supplied with fresh, clean oil.

Quiet—rotating parts carefully balanced; resilient-rubber mounting. Equipped with end-play silencers. Operation of the motor does not interfere with radio reception.

GENERAL ELECTRIC

Filing No. 8260

070-223

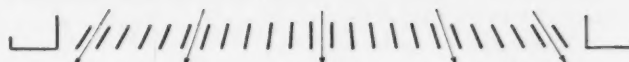
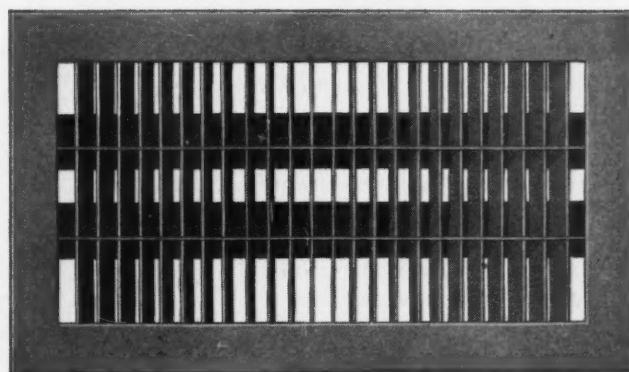
INDEPENDENT "FABRIKATED" *Adjustable* DIRECTED AIR FLOW REGISTERS AND GRILLES

*with deflecting
vanes give*

FOUR-WAY DIRECTION TO AIR FLOWS



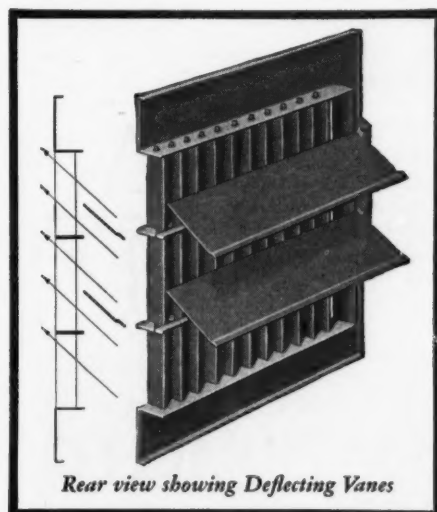
*Deflecting
Vanes direct
air flows
up or down.*



Vertical Grille Bars deflect air flows to right or left



Each grille bar is adjusted individually



Rear view showing Deflecting Vanes

• Deflections of air flows which hitherto have been impossible are readily effected with this No. 321-A Independent "Fabrikated" Register with Deflecting Vanes. Horizontal deflection of air, right, left or fanwise, is imparted by the grille bars. Deflecting vanes back of the grille bars add a vertical deflection, up or down. With this register or grille, compound deflections of air flows can be achieved with accuracy and certainty.

Each vertical grille bar, likewise each deflecting vane in the back of the register, is adjusted individually with a special two-prong tool which accompanies each register.

Adjustment can be made after the register or grille is installed without taking it down. Grille bars and deflecting vanes do not require locking. They are held firmly in place, and can not be adjusted without the special two-prong tool, nor will they vibrate nor rattle.

Independent "Fabrikated" Adjustable Directed Air Flow Registers and Grilles are also made with horizontal grille bars and vertical deflecting vanes. Both types are available in any size. They fulfill every requirement for strength, rigidity, appearance and range of directed air flows.

Send for catalog and data book

THE INDEPENDENT REGISTER CO.

3741 EAST 93rd STREET

CLEVELAND, OHIO

ANTHRACITE HEATING NEWS

PUBLISHED BY ANTHRACITE INDUSTRIES, INC.

CHRYSLER BUILDING, NEW YORK

● TWENTY-FIVE MILLION individual advertisements started the 1937-38 campaign of Anthracite Industries, Inc. This is just the opener.

When you consider that these millions of impressive advertisements are concentrated solely in the Anthracite selling area, you gain some idea of the tremendous impetus they will give to Anthracite equipment sales by heating contractors.

In addition to this huge campaign, hundreds of local Anthracite dealers are already running their own campaigns. They are tying in with the effort of Anthracite Industries, Inc.

Equipment manufacturers, and their dealers, are also adding their own great advertising strength to the whole. Thus, all three factors . . . producers, Anthracite dealers and equipment interests . . . are as one in completing one of the strongest promotion efforts ever put behind Anthracite.



A scene from the full-length feature movie, "Green Lights Ahead".

● "Green Lights Ahead," a full-length feature movie produced by Anthracite Industries, Inc., is more than entertainment. It presents practical sales methods for the coal dealer. Among other things it stresses the importance of close cooperation of the coal dealer with the heating contractor. The picture covers three eras. (Scene 1.) The "old timer," steeped in tradition, and who gasps when a customer wants an immediate delivery. (Scene 2.) The present day dealer is being convinced how he can grasp the full opportunities beckon-



Basement modernization almost always brings opportunities to the heating contractor for new equipment sales, installations or repairs.

ing to him. (Scene 3.) The happy climax. Here modern methods have lifted the 1940 Anthracite dealer to an enviable position. Anthracite Industries, Inc., representatives are scheduling dates for showings. Heating contractors are invited to attend these showings.

● "Modern Anthracite Equipment," a 32-page book recently published by Anthracite Industries, Inc., is probably the only book of its kind

ever printed. It contains between its covers a complete catalog of various types of Anthracite-burning equipment. For example, it tells how an inexpensive thermostat, and any adequate Anthracite furnace or boiler, provide automatic heat . . . and fueling periods up to 12 hours apart. It explains modern flat-grate furnaces and boilers. It tells how magazine-feed heaters need no fueling attention from 24 to 48 hours. The book describes new automatic Anthracite burners that need no fueling attention all winter long, and automatically remove ash to sealed containers. It describes new Anthracite space heaters, water heaters and cooking ranges. It suggests wide basement-modernization possibilities with modern Anthracite heating. The book will be helpful to every heating contractor. Write today for a free copy.

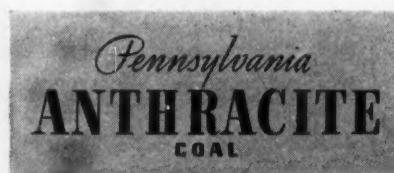
FLASH

MERCHANDISING SCHOOL

Anthracite Industries, Inc., now operates at Primos, Pennsylvania, a school for modern merchandising of Anthracite and its equipment. Its purpose is to instruct in the most up-to-date and effective methods. In addition to merchandising, the course includes fundamentals of heating, and a study of most modern Anthracite equipment. The faculty is made up of recognized experts in the various subjects. Classes are limited. Enrollment fees are very low. While inaugurated primarily for coal dealers and salesmen, heating contractors and employees find this course equally valuable. Write for descriptive circular, giving full information.

THE ONLY SCHOOL OF ITS KIND

This Seal of Approval appears on Anthracite equipment only after it has passed the most rigid tests in the heating field.




BIGGER *Lower OPERATING COST* **ECONOMICAL** **BETTER**

FINER **MOST** **Lower resistance** **more efficient** **Cheaper**

**CLAIMS BECOME FACTS—
ONLY WHEN PROVED!**

GREAT DUST CAP **CHEAPER** **Bigger** **EASIER TO INSTALL** **MORE EFFICIENT** **finer**

larger dust storage **BIGGER** **MOST**



IT'S easy to make claims—but claims don't become facts until they are **proved**.

The dust storms in the middle west offered an excellent opportunity for proving the claims that permanent washable filters were the most economical for air conditioning service.

Transcontinental trains caught in these storms when equipped with permanent washable filters of the American M/W type, arrived at their destination clean and comfortable despite the excess dust load imposed upon them. Cars in which other types were used did not fare so well. Filters of lower dust-holding capacity often became so clogged with dust before the trip was finished that they had to be removed to obtain any air at all in the car. This not only resulted in discomfort for the passengers but was expensive for the railroads.

This test so clearly demonstrated the superior performance and economical maintenance of permanent washable type filters that the American

M/W filter has become standard equipment for railroad air conditioning. Following the first dust storm more than 1600 American M/W filters were ordered by transcontinental railroads. Today more than 15,000 American M/W filters are serving over 7000 railroad cars in all parts of the country. Practically all of the new streamlined trains are equipped with M/W filters both for air conditioning and cleaning the intake air for the Diesel engines.

Manufacturers of industrial and domestic air conditioning equipment have taken a page from the experience of the railroads and are either offering permanent filters as standard equipment or are listing them as optional at small extra cost. Their own experience has further convinced them that it is false economy to impair the satisfactory performance of their air conditioning equipment with cheap filters that can only result in dissatisfaction.

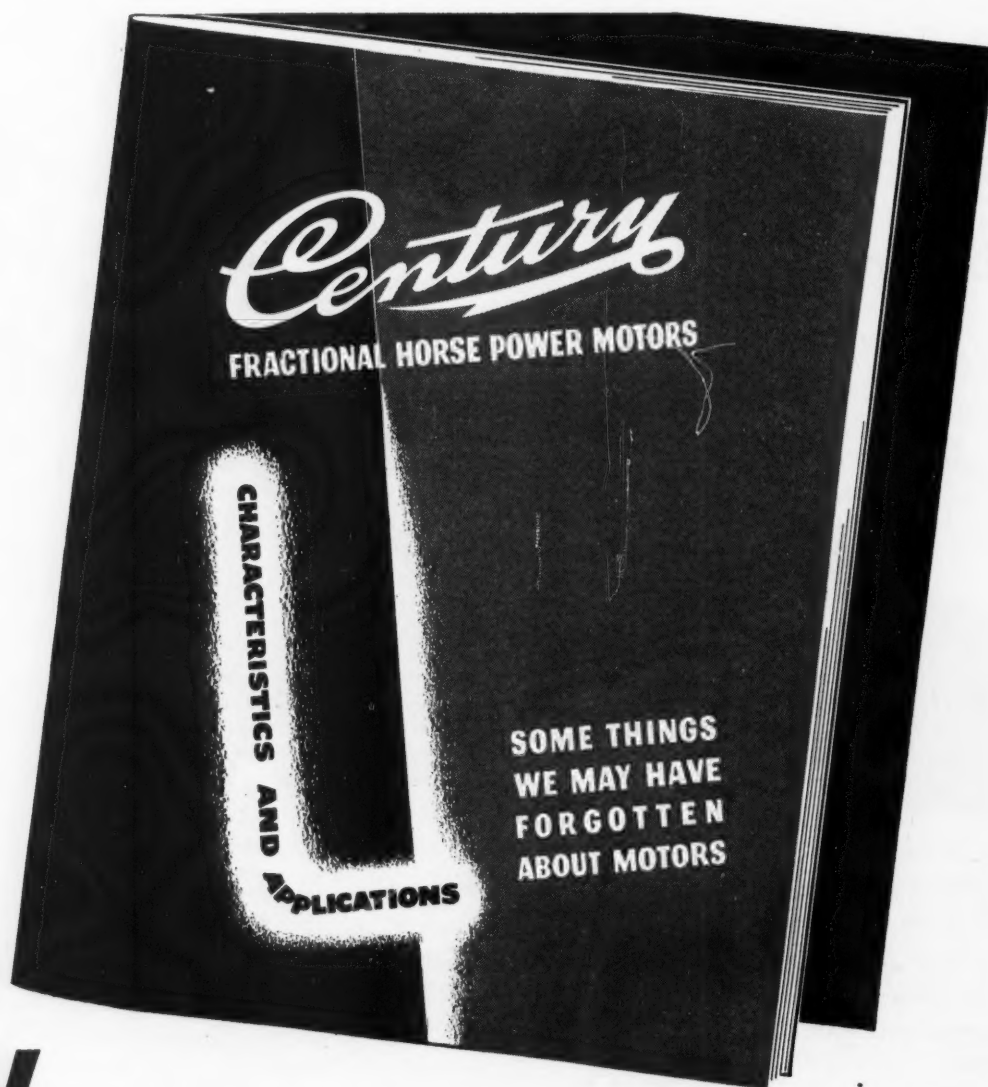
Complete data on the larger dust-holding capacity, the higher efficiency and greater economy of permanent filters is available on request to manufacturers and dealers who wish to keep abreast of this latest trend in the air cleaning field.

AMERICAN AIR FILTER CO., Inc.
INCORPORATED

113 Central Avenue

LOUISVILLE - - - KENTUCKY

IN CANADA: DARLING BROS., LTD., MONTREAL, P. Q.



THIS
BOOK
tells..

HOW *to* SELECT *the* RIGHT MOTOR

This New 24-page book will be of real assistance to you... Here is presented in helpful form information concerning the electrical characteristics of all types of Fractional Horse Power Motors—and suggestions as to how they can be most effectively applied to meet the requirements of motor-driven machinery and appliances operating in normal or abnormal surroundings... Fully illustrated... Send for your copy, if you have not received it... **ASK FOR BULLETIN 1039-D...**

CENTURY ELECTRIC COMPANY

1806 Pine Street

St. Louis, Mo.

Offices and Stock Points in Principal Cities



U P T O 6 0 0 H O R S E P O W E R

Performance of Oil-Fired, Warm Air Furnaces in the Research Residence[†]

By A. P. Kratz*
and S. Konzo**

Overall House Efficiency

IN order to compare the fuel consumptions of oil and anthracite, the fuel quantities shown in Fig. 12 were reduced to terms of heat input to the furnace, in millions of Btu per 24 hours, and were plotted as shown in Fig. 14. The results for the conversion unit (Curve No. 1) and for the oil-burning furnace (Curve No. 2) were obtained with an oil input rate of 13.0-lb per hour, a combustion condition of 9.5 per cent CO_2 and an air circulation of 1675 cfm. It should be noted that these tests were based on intermittent operation of the fan and oil burner, whereas the tests on the hand-fired coal furnace (Curve No. 3) were based on the maintenance of continuous combustion under which conditions the automatic controls varied the combustion rate so that it approximately corresponded with the heating demands of the house. In all three cases the operation of the heating plant was controlled by means of sensitive thermostatic controls.

From analyses of the flue gases when anthracite was

[†]Paper presented at the 43rd Annual Meeting of the ASHVE, St. Louis, Mo., Jan. 1937, and published in Heating, Piping and Air Conditioning, Dec., 1936.

*Research Professor, Engineering Experiment Station, University of Illinois.

**Special Research Associate, Engineering Experiment Station, University of Illinois.

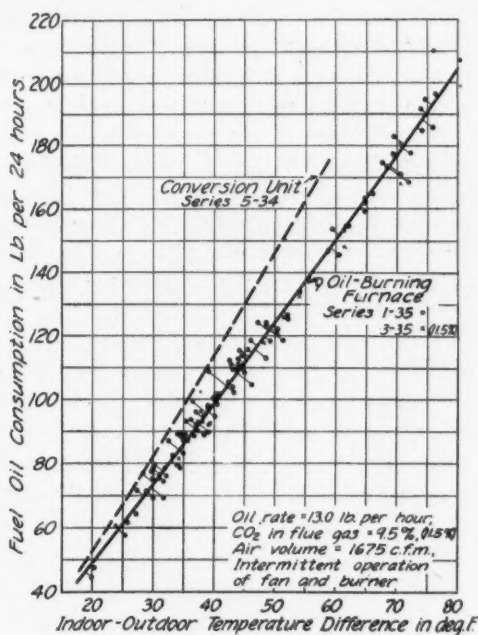


Fig. 12—Fuel consumption curves for two oil furnaces

used as a fuel, the heat lost in the gases escaping from the chimney, which represented heat furnished by the fuel that was not ultimately available for heating the house, was determined as approximately 10 per cent of the total heat input to the furnace. The actual heat loss from the house (Curve No. 4) was then derived from the experimental results for heat input obtained with anthracite as a fuel (Curve No. 3). By using these derived values of the actual heat loss from the house in connection with the fuel consumption curves for oil, the overall house efficiency could be calculated for the cases in which oil was used as a fuel in the conversion unit and in the oil-burning furnace. These curves representing overall house efficiency are shown in the lower part of Fig. 14. It may be noted that the values of overall house efficiency determined indirectly in this

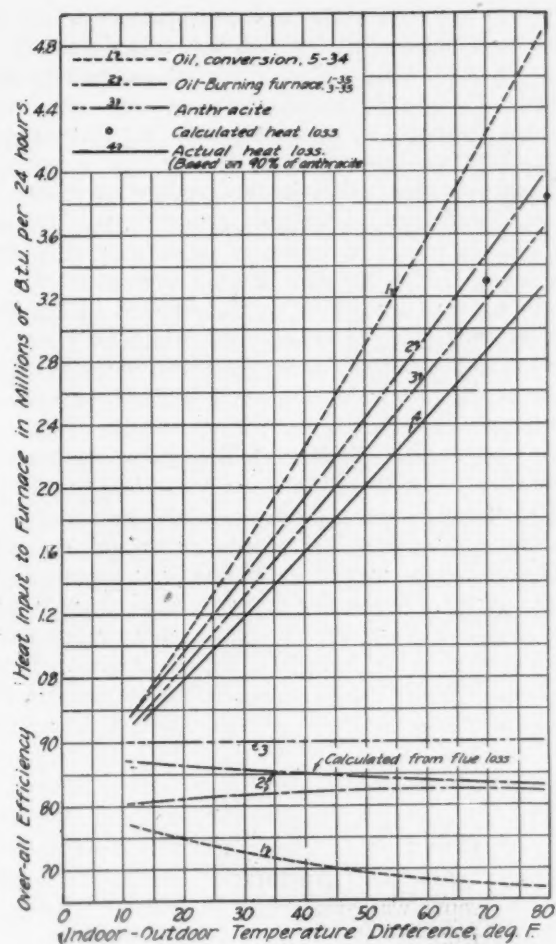


Fig. 14—Heat inputs to Research Residence

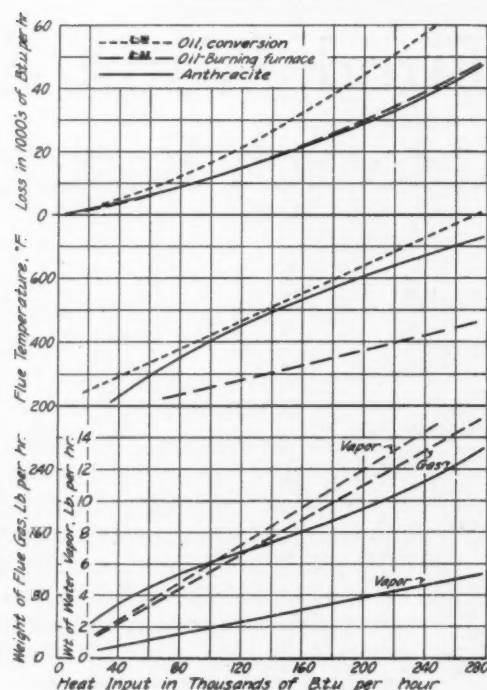


Fig. 15a—Analysis of flue gas losses

manner for the oil-burning furnace agreed reasonably well with the calculated values of overall house efficiency determined directly from an analysis of the flue gas losses during the periods of burner operation.

For the same weather conditions, the values of the heat input were less and the values of the overall house efficiency were greater for anthracite than for oil. The most obvious explanation for this difference is that the combustion efficiency for oil combustion was considerably less than that for anthracite. This most obvious explanation, however, was not satisfactory since there was no reason to believe that a material difference existed either in the combustion efficiency, or that the flue gas losses were greater in the one case than in the other. In order to make an independent analysis of the factors affecting the utilization of heat by the furnace, the weight of the products of combustion and the flue gas losses were calculated from the flue gas analyses and the temperatures of the flue gas, observations of which were made under conditions of continuous operation of the burner and fan. These results are shown in Fig. 15a plotted against the heat input to the furnace.

The flue loss for any fuel may be considered as a composite value which is dependent on both the temperature and the weight of the flue gas. A comparison of the curves representing flue gas temperature in Fig. 15a shows that the flue gas temperatures were lower for oil, when it was burned in the oil burning furnace, than for anthracite. This indicates that the flue gas temperature alone is not a reliable index of combustion efficiency when comparing different fuels. The products of combustion may be considered as being composed of dry gas and water vapor. The curves in Fig. 15a indicate that the weight of the dry gas was approximately the same for oil and for anthracite, but that the weight of water vapor was greater for oil than for anthracite, principally on account of the greater percentage of hydrogen in the former fuel.

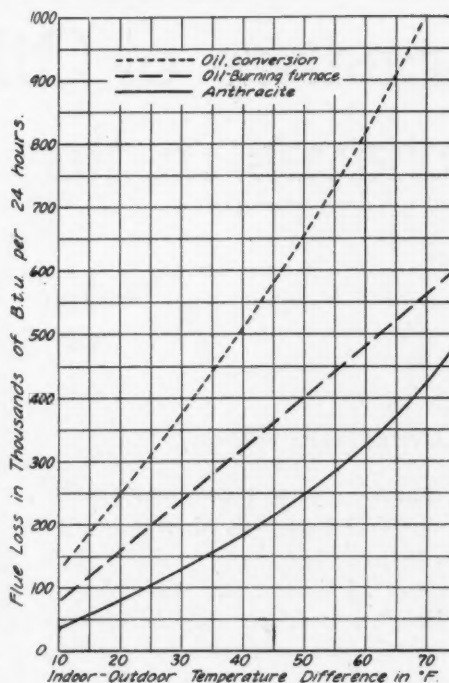


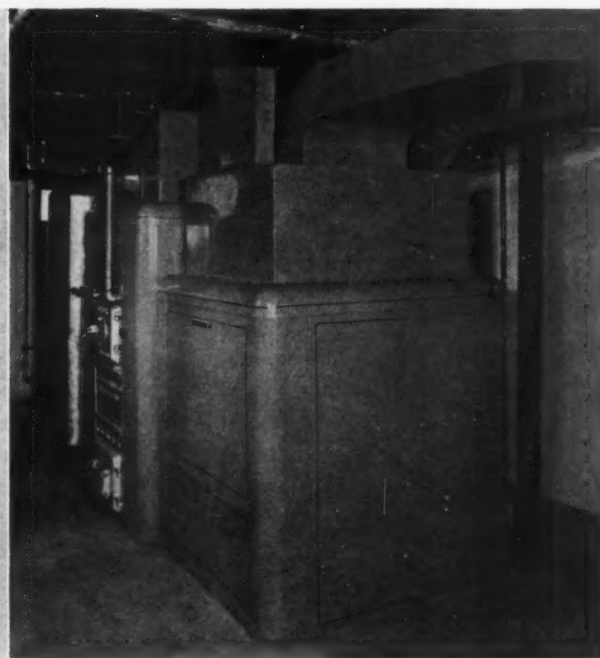
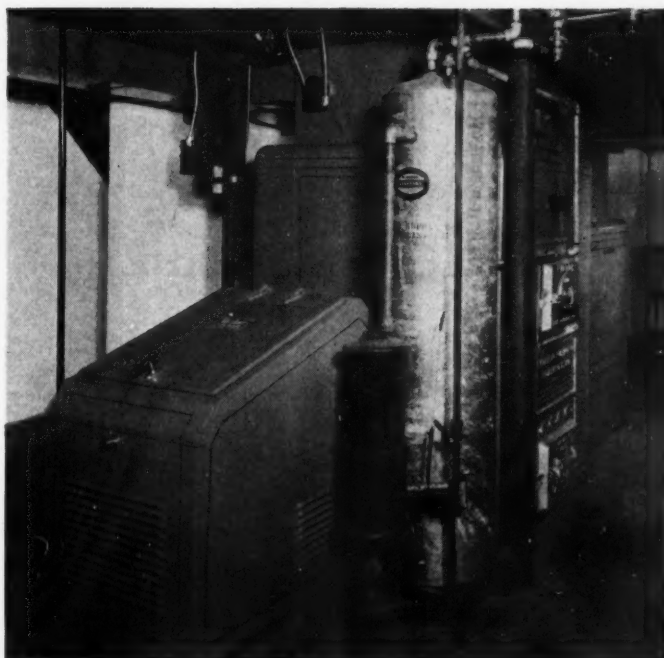
Fig. 15b—Calculated total flue loss

The combined effect of the flue gas temperature and the weight of flue gas determined the flue gas loss for various rates of heat input to the furnace. In this connection it may be observed, that it would be possible to still further reduce the flue gas temperatures by the addition of effective heating surface to the furnace. This would result in a smaller flue gas loss for all combustion rates, and hence in an increased efficiency. As indicated by the top set of curves in Fig. 15a the flue gas loss for a given value of heat input was approximately the same for oil (oil-burning furnace) and for anthracite. In other words, the combustion efficiencies in the two cases were approximately the same. Hence, some explanation involving factors in addition to combustion efficiency must be sought to account for the differences obtained in the heat input for a given difference in temperature between indoors and outdoors.

In the case of anthracite, the automatic control varied the rate of combustion so that it approximately corresponded with the heating demands of the house; namely with the difference in temperature between indoors and outdoors. Hence the combustion efficiency, as determined by the rate of combustion and therefore the heat input to the furnace, would be directly reflected in the curves of heat input to the house, Fig. 14, which are based on the temperature difference between indoors and outdoors.

However in the case of oil, the rate of oil input, or the hourly heat release, was constant for all weather conditions, and control was obtained by adjustments in the length of time that the burner was allowed to operate. Therefore, the combustion efficiency would be dependent on this rate of heat release and not on the temperature difference between indoors and outdoors. Furthermore, the net flue gas loss for a 24-hour period, during which the burner was operated intermittently, would be determined not only by the combustion efficiency but also by the total length of time during

(Continued on page 64)



Step-by-Step

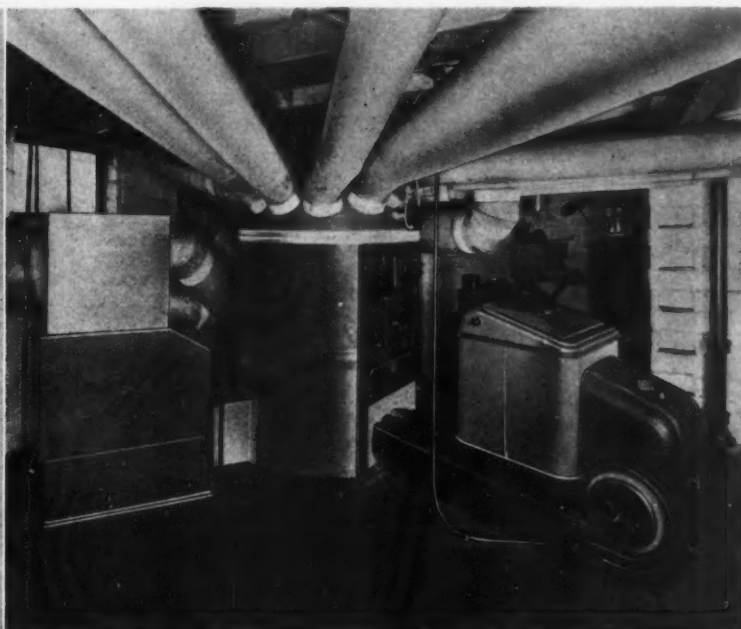
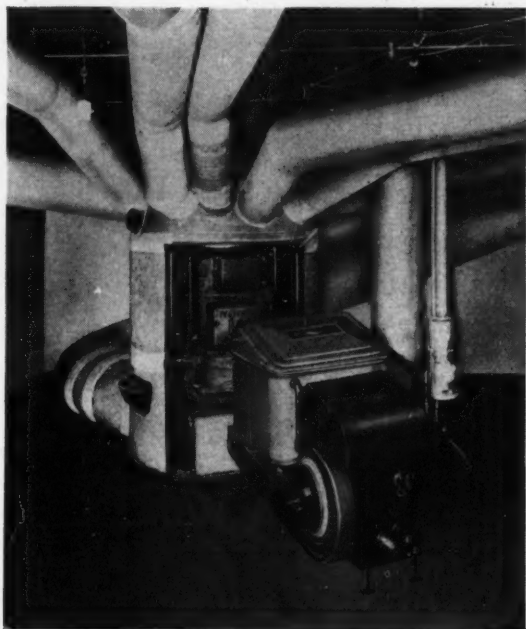
THE illustration on the cover shows the second stage in one home owner's conversion from a gravity warm air furnace to an automatically fired, mechanically circulated, winter air conditioning system. The last step will be to change to rectangular ducts close against the ceiling and the conversion of the basement from just a space below grade to a popular part of the house.

This photograph was sent in by the Schwitzer-Cummins Company of Indianapolis. From the same source comes the two photographs at the bottom of this page, showing two additional installations in which this step-by-step conversion is going on.

The photographs at the top of this page show two views of a completely converted system in which a gravity warm air furnace was supplanted by a rectangular cased, winter air conditioning system with side attached stoker and a blower-filter-

humidifier unit on the opposite side. All duct work is rectangular with cold and warm air plenums and the units have been placed against the wall to give the owner a free basement floor area. The furnace, stoker and conditioner in these photographs are standard units of the Hall-Neal Furnace Company of Indianapolis.

Indianapolis, as these pictures indicate, has proved to be an active field for contractors far sighted enough to see in such step-by-step conversion the solution to remodeling and conversion even though the owner may not have the money or be inclined to buy the complete system at one time. By this step-by-step method adherents of warm air heating retain the features which they like and add to these the very important advantages of mechanical circulation, filtering, humidifying, automatic heat with its comfort, convenience and economy.



Some Fallacies of 40% Relative Humidity [Part 2]

In the November issue we pointed out that 40 per cent relative humidity is a nice round figure to talk about, but practically impossible of attainment in most houses. And 40% R. H. is impractical because with single glass windows condensation and frosting is heavy below 35 degrees outside temperature. Following are some contractors' tests last winter.

TEST number 2 is a coal fired furnace with blower and pan evaporator in the base of the furnace. This is not a part of the base, but is a large shallow pan inserted into the casing just above the floor and ahead of the boot from the blower. The relative humidity maintained from day to day during the month of January, 1936 was charted on a 24-hour recorder.

One thing is evident from these tests—that the equipment used did a uniform job of keeping humidity around 30 per cent relative. Presumably during the night when fires died down less water was evaporated as shown by relative humidity dropping below 30 per cent. During the afternoon the humidity increased to 30 to 35 per cent and we can assume that more heat was being supplied.

The contractor says of this test—"We do not feel that we got very far with any definite information because the building leakage was so excessive that even with 3 humidifiers working at one time, we were unable to maintain more than a 28% relative humidity and owing to the several combinations it was almost impossible to measure the amount of water so that any information at this time would not be sufficiently authentic.

"We will say, however, that we learned a number of things that have considerable bearing on humidity through the excessive leakage of air. We also feel that the moisture requirements are coupled with the amount of air circulation in the house which is directly important as we see it as to what a comfort stage should be in any one particular home. In addition the health and age of the occupants of a building has also much to do with what humidity is required."

Frame Bungalow

Test number 3 was conducted in a frame bungalow of six rooms heated with a gas fired, forced air furnace. The humidifier operates without any control—the unit is set to evaporate a maximum of 8 to 12 gallons of water per 24 hours. The valve admits water to a pan as water is evaporated by the heat and air of the bonnet.

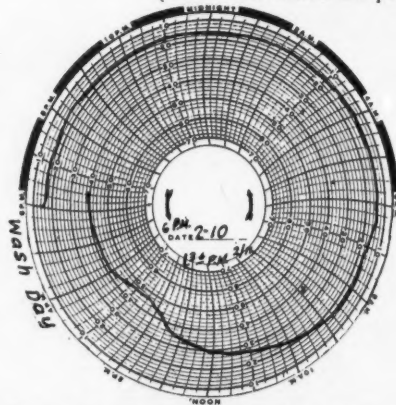
The windows are weather-stripped; there are storm sash on north and west exposures; ceilings are insulated.

The engineer operating this test checked the reading of the recorder with a sling psychrometer and found some interesting facts. The recorder had to be allowed to come up to room temperature before the mechanism was started. Also the machine had to be calibrated against the psychrometer *with the clock running*. Also the weight of the pen and pointer plus the drag on the paper made the recorder lag in recording changes. Most important, that after calibrating the instrument at any one given point, such calibration was no assurance that the instrument would likewise be in calibration with the psychrometer at all other points.

As a result the records must be scrutinized with these drawbacks in mind. If absolutely accurate readings are needed the psychrometer is the most positive instrument.

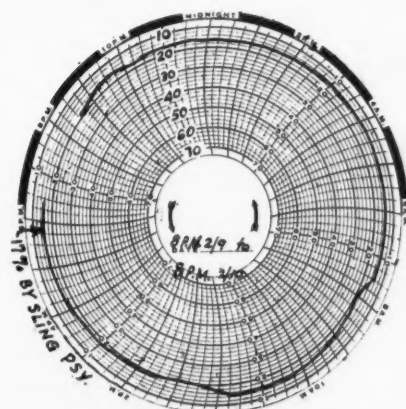
The engineer reports an interesting day on February 10—washing day in the house. Presuming that washing operations began about 8 AM the relative humidity then was 13.5 per cent. By 10 AM this had increased to 22 per cent; by noon to 30 per cent; by 2 PM to 44 per cent; at 3 PM the maximum was reached at 46 per cent; and thereafter dropped off to 40 per cent which was held until 7 PM.

(Text continued on page 62)

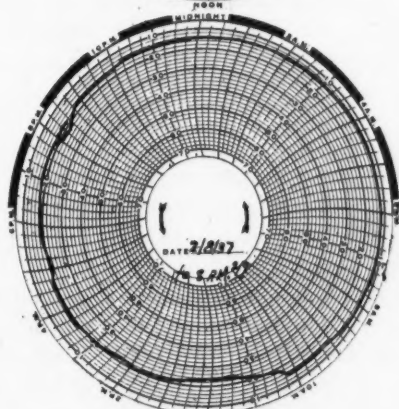


Temperatures
Midnight = -2
6 - A.M. = -9
Noon = -1
6 P.M. = +1

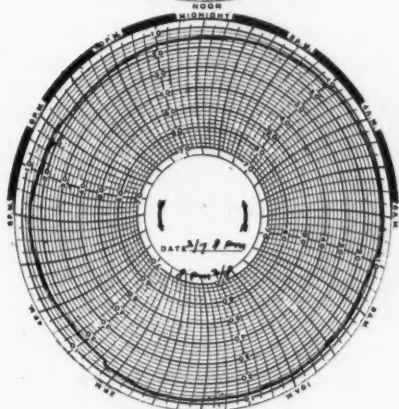
Chart showing humidities in a house on "wash day." Note rapid increase in R. H. after washing started.

*Temperatures*

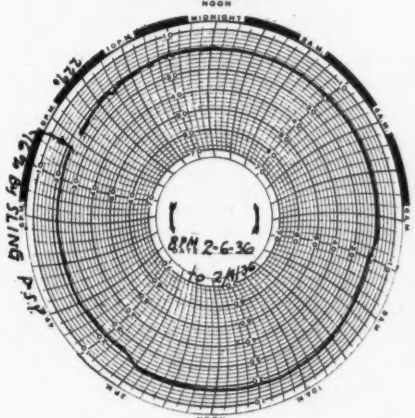
Midnight = -7
 6 A.M. = -9
 Noon = +1
 6 P.M. = -5

*Temperature*

Midnight = -7
 6 A.M. = -11
 Noon = -11
 6 P.M. = -11

*Temperatures*

Midnight = -7
 6 A.M. = -11
 Noon = -11
 6 P.M. = +20

*Temperatures*

Midnight = -2
 6 A.M. = +1
 Noon = +13
 6 P.M. = +3

Fig. 3—Relative humidities for February 6 to 10 with outside temperatures from -13 to +20 degrees. This is a frame bungalow, gas heated, forced air, weather stripped, storm sash at north and west. Note checks with sling psychrometer. Text explains how recorder was calibrated each day.

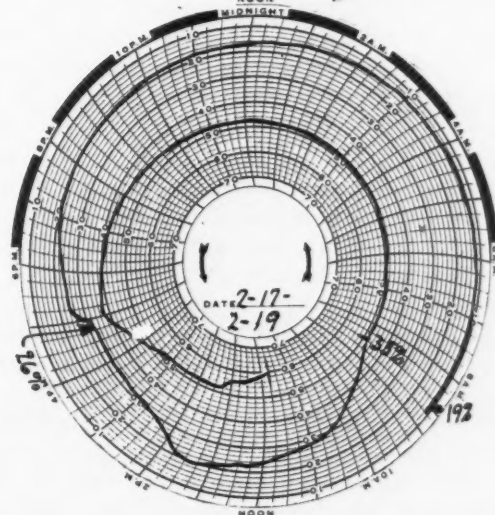
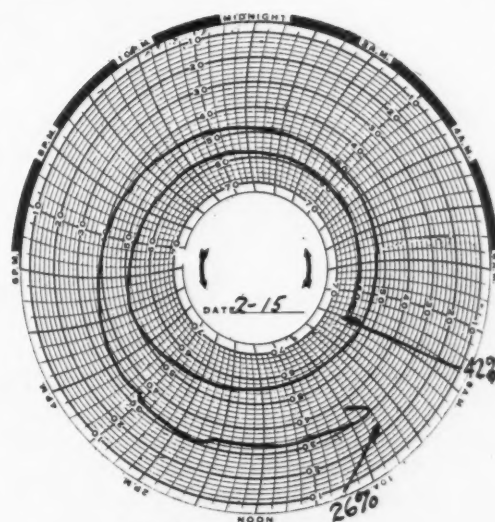


Fig. 4—Recorded charts checked by the sling psychrometer showing errors in recorder. Charts indicate importance of best possible instruments and frequent checking.

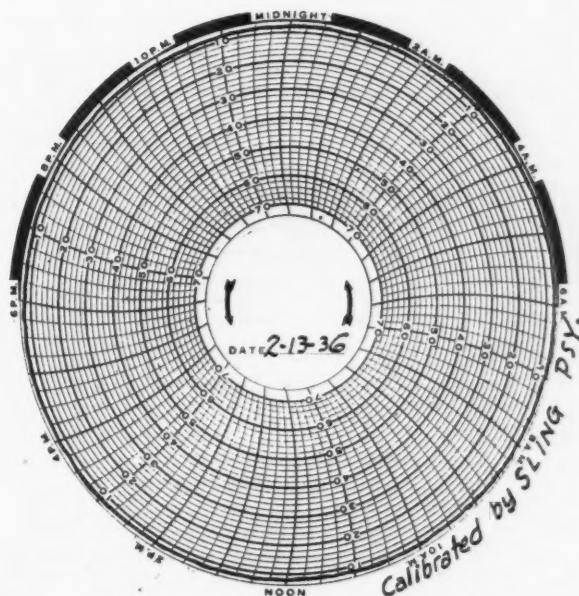


Fig. 5—Chart of R. H. in a steam heated hotel room. R. H. was too low for the recorder to register. The pen traveled all day against the outside of the dial.

Air Conditioning in New Zealand

By H. F. Purcell

Engineer, W. H. Harris Tinsmiths, Ltd., Christchurch, N. Z.

FOR the ten years prior to 1930 the writer was making installations of modern (then, that is) warm air heating systems, with occasional forced air jobs, in the larger schools in British Columbia.

As conditions in 1929 clearly indicated the probability of a scarcity of heating jobs for the near future the writer decided to seek fresher fields and selected New Zealand because the climatic conditions approximated those of Vancouver, B. C.

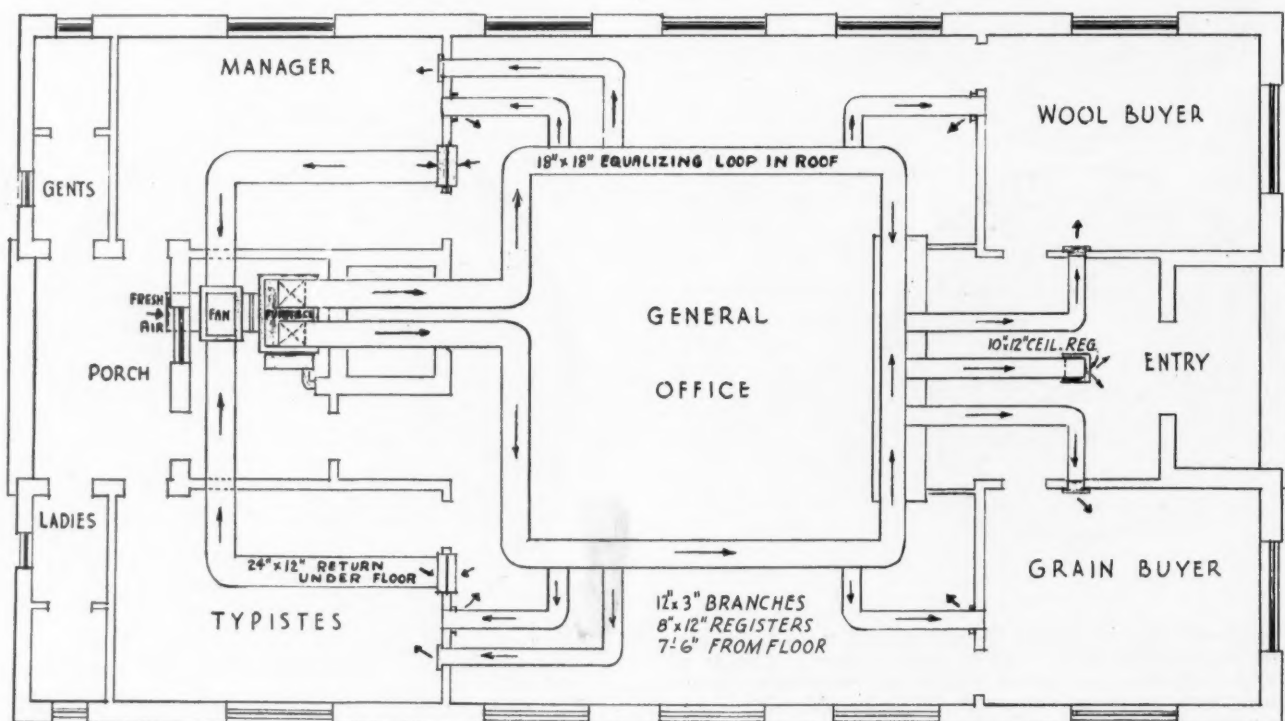
On arrival it was found that the only attempts at warm air heating were based on the so-called pipeless furnaces, which, because there were no basements, were installed on the first floor with both the warm air and return air sections of the grille carried up to about the eight-foot level from the floor, ninety-degree elbows fitted and a floor grille set in the partition between the furnace room and the room to be heated. The feeble results obtained can very easily be imagined.

However, there was a definite demand for a successful system and we set about designing not only gas- and coal-fired furnaces to suit the climatic conditions, but also a system which could be con-

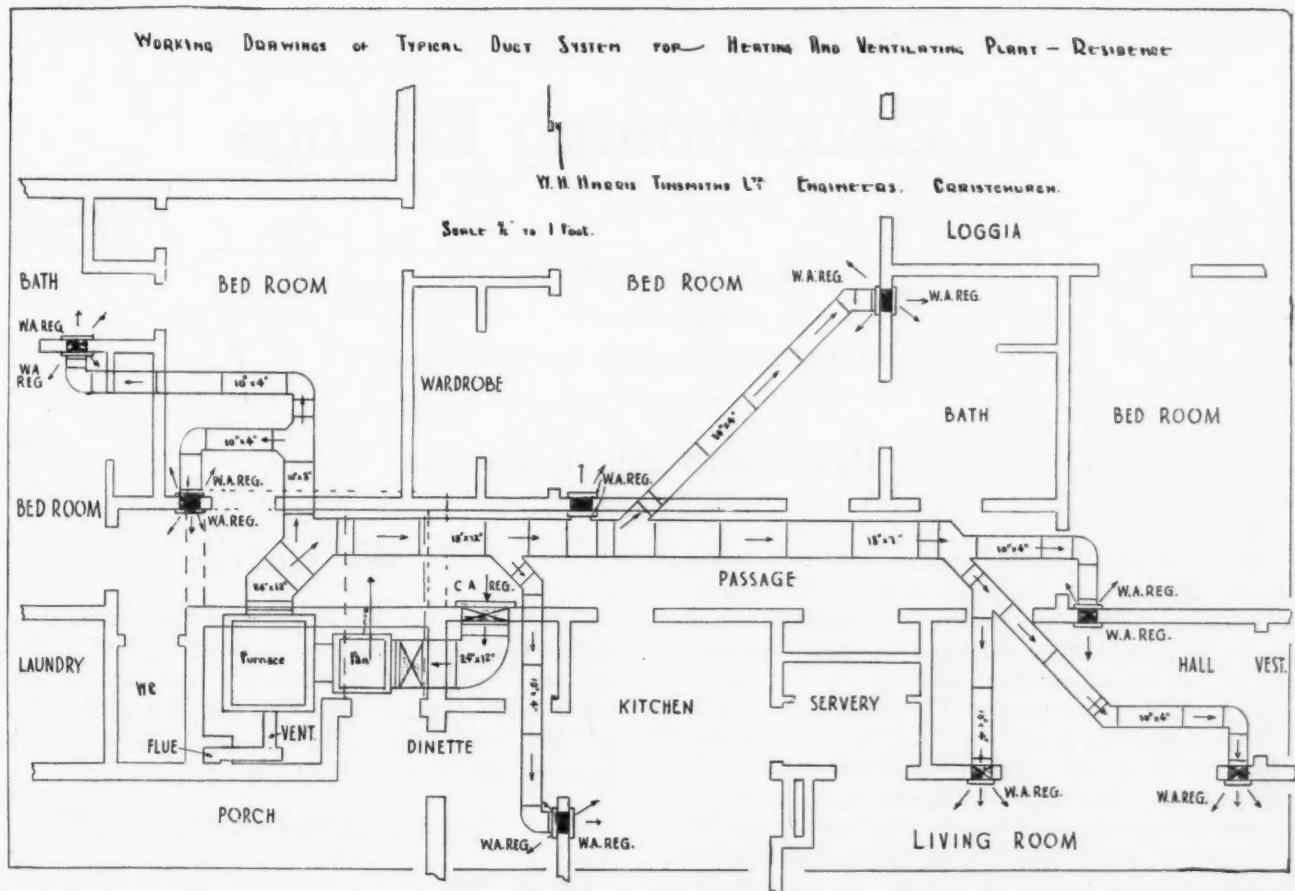
cealed within the structure (without basement) and at the same time function with efficiency and economy. A booster, or volumetric fan, was decided upon according to size and purpose of building.

The maximum extremes of cold and heat here are from 20 above up to about 100 in the shade in Summer, but in the Winter we get plenty of warm sunshine and, generally speaking, heat is not required between 10 a. m. and 2 p. m. The average Winter temperature is around 42 degrees F.

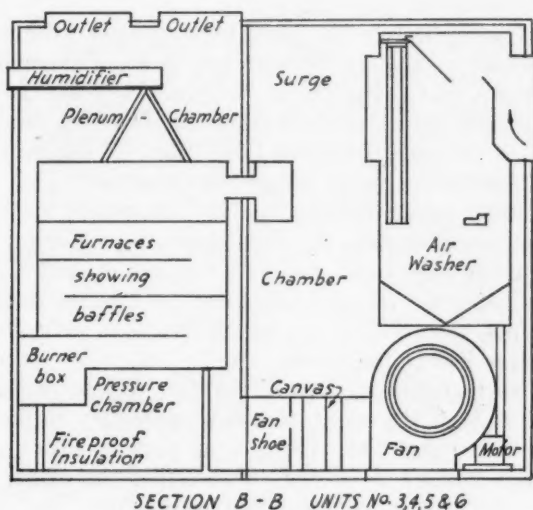
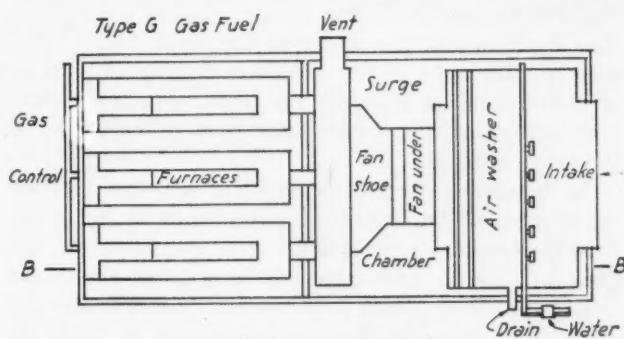
On the face of it, provided that town gas could be obtained at a reasonable price, it looked as though gas would be the logical fuel. Fuel oil could be obtained at 14 cents at main ports whilst coal of good quality cost 15 dollars a ton. The Wellington Gas Co. was at that time doing a lot of pioneering in heating by gas and had a special heating rate of 96 cents per 1,000 cubic feet of gas with a calorific value of 480 Btu. They were using an American gas-fired unit, but since the buildings were not suitable for gravity systems and the furnaces were definitely built for gravity work, the



Forced air heating system for a single story produce brokerage office using one of the "loop" distributing systems described by the author. The building has no basement, so an equipment room is used. Note that the "loop" is located in the attic.



Heating and ventilating system (see authors designation of system functions) for a large residence having no basement. Ducts are carried beneath floor with risers to registers. Equipment is housed in a small excavation beneath floor. Below is diagram for a 400,000 Btu. heater using a washer for cleaning.



applying of fans caused some trouble through condensation of the products of combustion within the furnace.

However, after considerable experimentation our firm designed and built a range of gas-fired furnaces with output capacities from 90,000 up to 450,000 Btu. especially arranged for booster and forced air systems. This system is now in general use in New Zealand.

Although the furnace has always proved very efficient in operation, it was still necessary to design a system more suitable for local conditions than the usual American type of installation. Since a basement was only met with once in a blue moon, there were only two possible places where ducting could be run where concealment was necessary: Either under the floor (which was not desirable for several reasons) or in the roof space. The latter is the more general in our current installations.

Round pipes do not appeal to us owing to the difficulty of making joints in confined spaces, so we set to work and designed our own type of rectangular panelled ducts with rigid locking swords. These are made in standard sizes and lengths together with necessary bends, tees and transitions. Stocks of these duct fittings are kept, already formed, but not seamed up and are sent in the "flat" to the job which may be anything up to 800 miles

(Continued on page 70)

Pattern Development for

Air Conditioning Fittings*

By William Neubecker

Head Instructor

Sheet Metal Department, New York Trade School

Reducers and Offsets

FIG. 24 shows another type of reducer where a branch taken from the trunk line is reduced to different dimensions (having similar area) leading to a wall stack. This is a simple pattern. The bottom and sides can be laid out in one piece, then the top is locked to same using the hammered or Pittsburgh lock.

Note in the side view the ceiling line of the reducer is flat, while the lower part 3-4 tapers as much as desired. In the plan view both sides taper equally as shown. The *plan view* gives the shape of the *top pattern* against the ceiling. For the pattern for the sides, bottom and the method of joining the sides to the bottom, the following method is employed:

Take the length of the flare 1-2 in plan and place it on the vertical line at the left shown by $1^\circ-2^\circ$, from which points draw lines at right angles as shown. Now take the vertical height at 3 and 4 in side view and set them off from 1° to a and 2° to b and draw a line from a to b to complete the pattern for the sides. For the bottom pattern take the length of 3-4 in side view, and set it off on the vertical line below, from 3° to 4° .

Through these points draw horizontal lines as shown. Measuring from the center line in plan take the distances to 1 and 2 and place them on either side of the center line in pattern shown respectively by c and c, also d and d. Draw lines from c to d on both sides as shown, to complete the bottom pattern shape.

Small Sized Ducts

When the duct is of a small size the side patterns can be joined to the bottom as follows: With $a-1^\circ$ in the side pattern as radius and points c and c in bottom pattern as centers, describe the short arcs at 1^v and intersect them using points d as centers, with radius equal to $b-1^\circ$ in side pattern. Now with $1^\circ-2^\circ$ in side pattern as radius and points 1^v in the combined pattern as centers, describe the short arcs at 2^v and intersect them by arcs struck from d and d as centers with a radius equal to $b-2^\circ$ in the side pattern. Connect lines in the combined pattern as shown, then will $1^v-1^v-2^v-2^v$ be the desired net pattern to which edge must be allowed for locking and slip or drive cleat connections.

*All rights reserved.

Simple Reducer

Fig. 25 shows the plan and elevation of a plain, simple reducer. Note that there is only the flare in the side view, while the plan shows a continuous width of the duct. The side view also gives the pattern for the sides which can be added to each side in plan as explained in connection with Fig. 24.

Compound Double Offset

Fig. 26 shows how a compound double offset in a rectangular duct of equal area throughout with angular corner miters is developed. Note in the plan that 1-2-3-4 indicates the profile of the vertical duct at the top and the section C, the vertical duct at the bottom. The distance that the center of the lower duct C projects to the right of the center of the upper duct A is indicated by A-B, while the distance between these two centers or that which leans toward the reader is indicated by B-C.

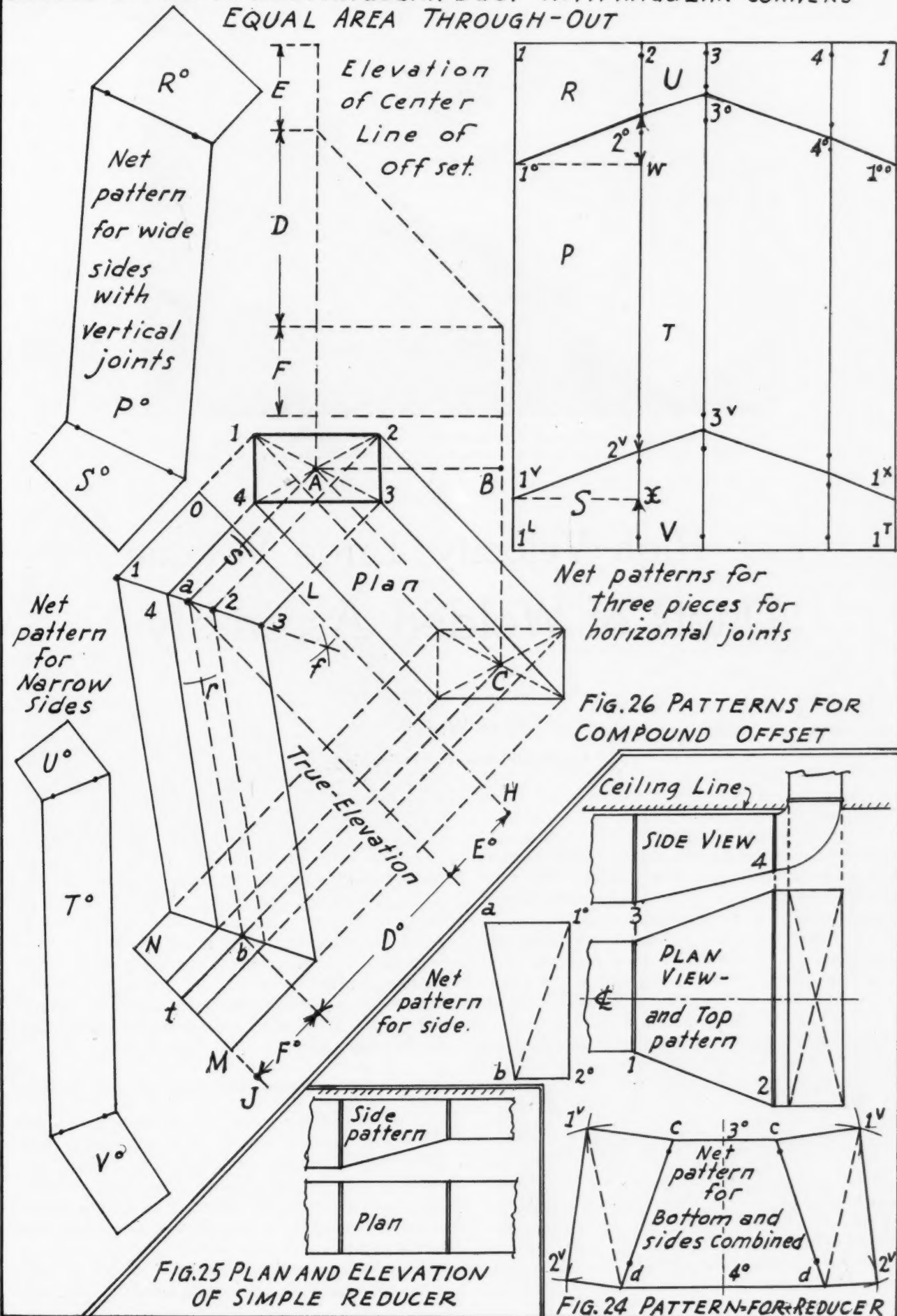
In this case these two projections A-B and B-C are equal, but can be of unequal projections as far as the principles in developments are concerned. Above the plan is shown a foreshortened elevation of the *center line* of the offset, which is not necessary in the development of the pattern, but is shown here to give the heights of the collars E and F and the *vertical height* of the middle piece D.

Having drawn the plan in its proper position according to required dimensions, draw the center line from A to C. Parallel to A-C draw any line as O-H. At right angles to O-H draw the line H-J on which place the vertical heights $E^\circ-D^\circ$ and F° obtained from similar letters on the center line elevation.

From the arrow points on H-J draw right angle lines and intersect them by lines drawn at right angles to A-C in plan from the center points A and C, thus obtaining the intersections a and b. Connect these two points, then will s-a-b-t be the *TRUE ELEVATION* of the *center line* of the offset.

So that the full area of the duct will be maintained throughout the offset, it will be necessary to find and draw a miter line. Using a as center (with any desired radius) draw arcs intersecting the center lines
(Continued on page 72)

DOUBLE OFFSET IN RECTANGULAR DUCT WITH ANGULAR CORNERS
EQUAL AREA THROUGH-OUT



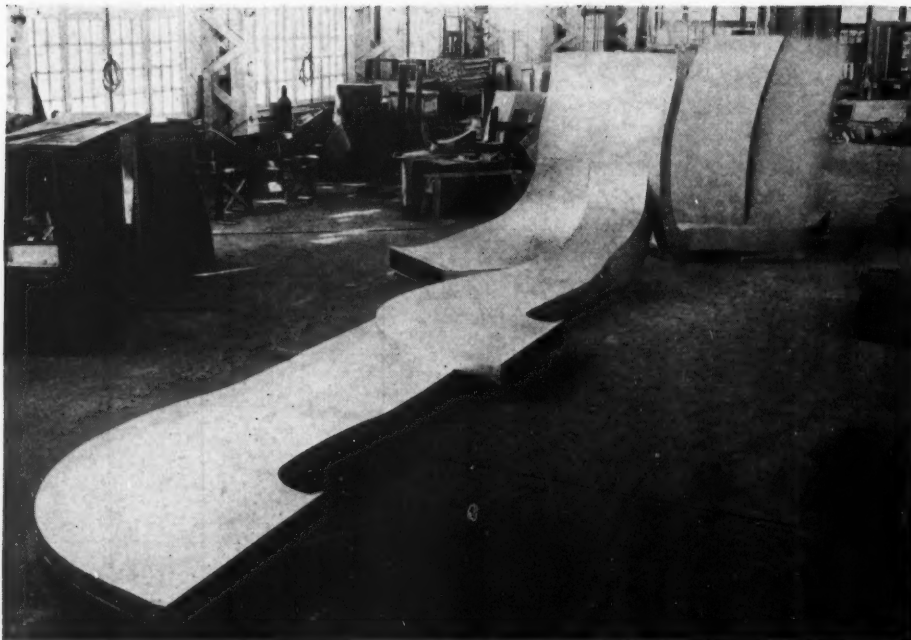


Fig 3—These ducts had to be made very shallow in order to conserve head room. Streamlining and engineering analysis of air flow characteristics brought desired results.

Flat, High Velocity, Large Volume, Ducts of Welded Assembly

By M. W. Pehl

Kansas City School of Engineering

IN these days of changes in design and fabrication ideas for handling air in cooling systems, there may be some interest in the photographic examples of 16-gauge welded duct construction.

The contractor for this job was the National Air Control Co., of Kansas City, now defunct. The work was designed for and installed in the Cloud Club, which occupies the 66th, 67th and 68th floor of the Chrysler Building in New York City.

Due to the large size of these ducts and the high velocity required to carry the volume of air to be introduced into the conditioned space, ordinary gauge of metal was not adapted to this kind of work.

Pattern Development and Assembly

Some very interesting problems in duct layout were involved. The patterns were developed to a 1½-inch scale drawing and blueprints were used to lay out the pattern duct on the metal. Fig. 1 shows a twin outlet of the nozzle type. Velocities up to 2,500 feet per minute have been handled suc-

cessfully with these outlets. Note the careful stream-lining that was necessary to keep down the noise factors and reduce the resistance of the air to its minimum. Electric arc welding was used to build the seam, and when these fittings and ducts were used in a space where clear, sharp edges would be required the excess metal built up by the welding rod was ground smooth and a clean cut duct job was the result. These outlet nozzles were 12 inches deep by 36 inches wide.

Welding and Shipping

After the blueprints had been made up for the duct work and the sheets cut to size and to templates, they were tack-welded together in eight-foot sections and then arc-welded throughout. Surplus metal was ground off by means of a portable grinder and the ducts given a coat of paint sprayed on with an air gun.

The ducts were then nested and crated for shipment to New York by freight, some of these sec-

tions were 48" by 60" by 8' 0" long and it was with much difficulty that we could get these sections up to the 68th floor of the building.

Owing to the high velocity that the air travels through these ducts and to hold down vibration noises number 16 gauge steel was used in the construction of all ducts for this contract. Special outlet nozzles had to be installed to control the air in the rooms that were serviced by this system.

Fig. 3 shows a rather interesting run of duct that had to be made very shallow in order to provide head room for people walking under these ducts. Under ordinary circumstances, ducts as shallow as



Fig. 4—This section follows the double curve of a circular arch. The unit is entirely welded. A small scale model of the job was used to develop measurements for patterns.

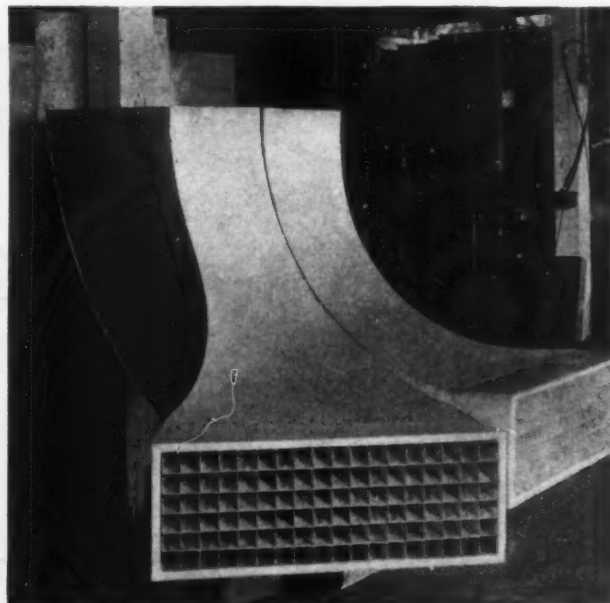


Fig. 1—These double, 36 by 12-inch nozzles, handle velocities of 2,500 fpm without noise. The section is completely welded, including the face grille.

these would be considered almost worthless as a means of carrying air, but modern air conditioning engineering is proving that old methods and old standards need to be revised. The answer to this difficult problem lay in a system of ducts that made a sheet metal worker wish for ducts fabricated out of rubber instead of metal. Note the small duct that leads to the rear in this picture. All of this work was assembled on the floor of the shop before it was taken apart and shipped out of town.

Fig. 4 shows a very ingenious double curved air duct of the same gauge iron and welded construction. This duct had to follow the contour of the inside of a circular arch that curved in two places like a quarter section cut out of the body of a funnel. To give the shop engineering staff a better idea of its layout, a $\frac{3}{8}$ -scale, cut away model of the three floors of this particular job was made out of light sheet metal. A model system of ducts and blower was installed so that the shop could fabricate this work which was made in Kansas City and shipped to New York.

Handy and Safe Lever Block

Small tough and strong blocks to place under the neck of a pry or "Johnny" bar are often a hard thing to find when you need them in a hurry. Wood is useless as it crushes and gives way under the bar leverage. A straight piece of iron is dangerous, as it is liable to slip, turn over or allow the bar to do the same thing. Cut off and keep handy for just such occasions three links of an old chain. As the neck of the bar comes down on the center of the cross link to lift or raise the load, the ends of the two other links close in tightly to both sides of the bar. Due to the rear half of the top link bearing on the sides of the other links, the blocking has no chance to move either forward or back.



EDITOR'S Roundtable

Basement Recreation Rooms

THE problem of supplying satisfactory customer comfort in basement recreation rooms is more complicated than many contractors are willing to admit. That such rooms have not been satisfactorily heated in the past is attested to by dozens of installations in most localities where these rooms have been handled like any other exposed room with subsequent complaint from the owner.

Admitting that such rooms below grade cannot be treated like rooms above grade, what are the factors which make ordinary engineering inadequate? Of most importance (and most frequently overlooked or sidestepped) is the fact that the floors and walls of these below grade rooms are cold. The materials of the floor and walls tend to assume the temperature of the touching ground and because floors and walls particularly are thick and of masonry it requires some time to bring the materials to room temperature.

These cold walls and floor greatly increase the radiant heat loss from the body with the result that while the air in the room may be 70 degrees or more the body radiates heat to the cold walls and floor and the occupant feels chilly.

Basement Usage Changes

Another factor which must be considered is usage. When basement recreation rooms were first popularized, owners built rooms for games like ping-pong, or shuffle board—in other words, for exercise. Contractors, assuming that these rooms would be used for these purposes, naturally decided that 70 degrees was too warm and that 55 or 60 degrees ought to be about the correct temperature. But owners quickly adopted these rooms as card rooms, children's play rooms, the "hide away" for mother or father or a place to shunt the children with their toys, radios, and noise. Children or adults using these rooms for quiet pastimes found 55 or 60 degrees much too cold and also that areas near walls were entirely uncomfortable.

The remedy for these conditions and changed requirements was higher temperatures. But the question is—how much higher? Also can raising the air temperature make all parts of below grade rooms comfortable?

With the conditions of occupancy and usage better known today and with a full appreciation of the problems presented, what are engineers doing in the way of design to make these below grade rooms livable? To answer this question, contractors and engineers were asked how they handle the design and the replies were sorted and grouped and form this roundtable report.

What Is Ground Temperature?

While material was being gathered, F. H. Geer, Engineer, Standard Furnace and Supply Co., Omaha, sent in a report compiled by professors and students in Hastings College, Hastings, Nebraska, dealing with actual ground temperatures. This report of tests throughout one winter is interesting in that it brings out some little known facts on what actually are ground temperatures throughout a winter.

The new Technical Code says that ground temperatures are to be calculated as 25 degrees above zero in zero weather. The heat loss therefore is for a temperature difference of 25 degrees above zero to room temperature times the coefficient of heat transmission for the material and wall thickness per square foot times the area of wall or floor.

Before we report how other engineers handle cfm requirements and number and location of supply and returns in below grade rooms we publish the report from Hastings College. Hastings, by the way, lies on a line: Salt Lake City—Peoria, Ill.—Lafayette, Ind.—Pittsburgh, Penna.; and has a total annual degree day rating of about 6,000 degree days. Its lowest extreme recorded temperature is 30 degrees below zero; takes a design temperature of 25 degrees below zero; the average heating

Simplify

AUTOMATIC CONTROL INSTALLATION with "GENUINE DETROIT" PACKAGE UNITS

Use this handy Thermostat and Relay Package Unit for the installation of unit heaters, coal blowers, hot water circulators, etc. It offers you the advantage and economy of modern low voltage equipment at approximately the cost of a high voltage installation.

Included in this Package are the "Genuine Detroit" Two-Eleven Thermostat with compensator, the No. 298 Relay, 35 ft. of 3-wire cable, and a supply of insulated staples.

The Two-Eleven Thermostat is not only extremely sensitive, but it provides easy adjustment of heating cycles over a wide range to compensate for any local conditions that may be encountered.

Another Package Unit of "Genuine Detroit" Controls, now available for the quick installation of gas burners for boilers or furnaces, includes the Two-Eleven Thermostat, the No. 688 Solenoid Gas Valve (pipe size either $\frac{3}{4}$ " or 1"), a transformer, 35 ft. of 3-wire cable and a supply of insulated staples. Also available with "Genuine Detroit" Limit Controls for either steam, hot water, or warm air.



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season is about 260 days with an average winter temperature of 40 degrees above zero.

The report on ground temperatures was submitted by Harry R. James, Professor of Physics, and John Youngblood, Laboratory Assistant. The report says:

"Our original plan was only to take enough data so as to be able to calculate the diffusivity of the soil for, with this constant known, we can calculate the temperature range at the different depths when the duration of the cold wave is known. However, there has been quite a lot of interest shown in other phases of the problem and so we are taking a somewhat more elaborate set of data than we needed for the original job. We measure temperatures by means of thermocouples which are buried at intervals down to 4½ ft.; we chose this depth because that is the depth at which the water mains are buried in Hastings. The couples were approximately 10 feet from one corner of the foundation.

"Perhaps the apparatus that we used may be of interest. Essentially, it consisted of ten thermocouples and a sensitized potentiometer. The small diagram will give the exact picture. The couples were made of iron and constantan wire, the iron being well insulated to prevent rusting. The ten couples were buried in the ground at known depths, namely: 0 ft., 3 in., 6 in., 1 ft., 1½ ft., 2 ft. 9 in., 3½ ft., 4 ft. 3 in., and 5 ft. These couples were connected to a common switchboard inside—as

shown in the diagram. These served as the cold junctions. A common hot junction was maintained inside and by the switch arrangement we could put any couple in the circuit with the hot junction. The latter was kept at 100 deg. C. throughout all readings. The readings were taken on the potentiometer, sensitized several times by the additional resistance shown in the diagram, and standardized by a standard cell. We very accurately took the reading when the temperature difference between junctions was 100 deg. C. and hence we could calculate from this reading, plus the temperature of the hot couple which was shown, and the reading involving a couple of unknown temperature, the temperature in the ground. (See drawing below.)

Procedure and Calculations

"Readings were taken daily and oftener if possible. We found that at no time—at least in this locality—did the temperature at a depth of 5 ft. get below 33.4 deg. F., and at 4 ft. 3 in. it stayed at 32 deg. F. for over two weeks but never got colder. Above this depth the temperature fluctuated considerably, according to the fluctuations above the ground, and it got down to about 15 to 18 degrees F. at 2 ft. below the surface.

"Concerning the diffusivity, we used a formula, which may be attributed to Ingersoll and Zobel of the University of Wisconsin, which employs the

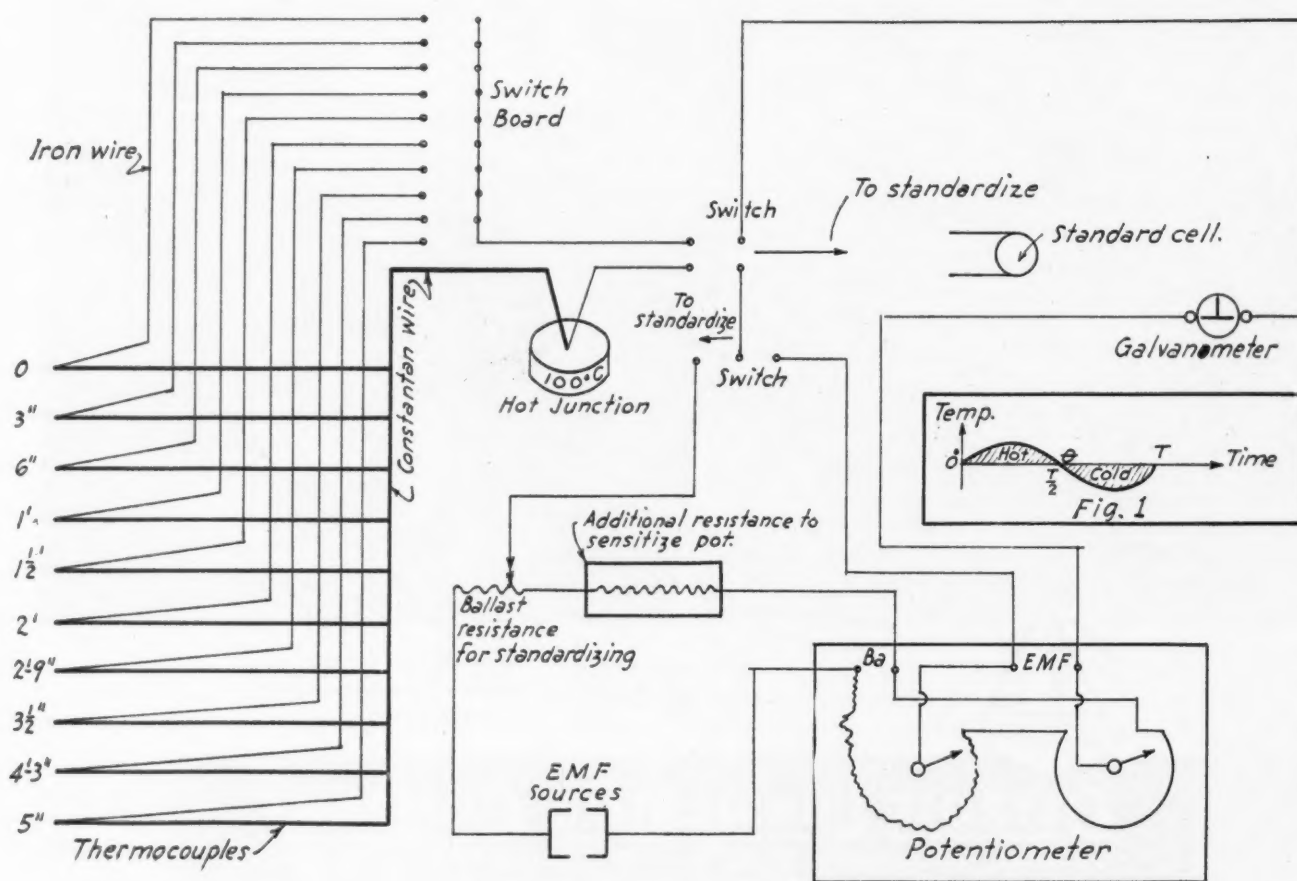
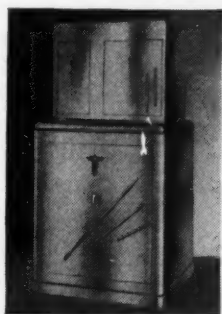


Fig. 2 Diagram of Circuit

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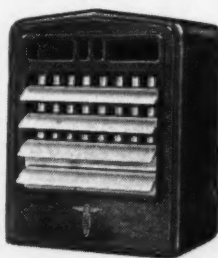
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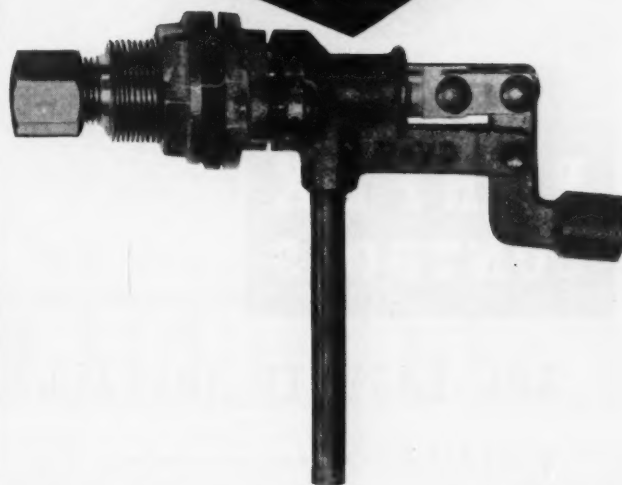
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The Humidifier Valve is made in four styles for ease of installation on any furnace. It's easy to install. It comes packed in a neat box with all necessary parts and full instructions.

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diffusivity along with some easily measurable quantities. The formula:

$$R = 2\theta e^{-\frac{x}{h}} \sqrt{\frac{\pi}{T}}$$

"The 'T' is the number of seconds that the 'cold wave' covered; for example if it begins to turn cold today and continues for two days to get colder and then requires two days to warm back up to the present temperature after which it goes ahead and gives us a warm season we would say that the temperature cycle was 8 days and express this time in seconds to use for T in the formula. The π is the ordinary 'Pi' used in finding circumference of a circle, etc. The 'x' is the number of centimeters below the surface at which we are interested in finding the range of temperatures. The Greek letter θ is the total drop in temperature during the cold wave. The 'h' is the Diffusivity which is a constant varying with the soil texture and moisture content. It usually runs from .05 to .07. Concrete may be around .076 to .08. The 'e' is the base of the system of natural logarithms.

"It is easily seen that we had the quantities necessary to compute h. However, this formula assumes that the temperature varies in time as a sine curve, that is, if the temperature were plotted versus the time it would give the curve shown as Fig. 1.

"Hence, it was necessary to take the thermograph charts and find a period where this was true. It was not as difficult as one might expect. I found such a period that lasted from March 26 to April 5. Taking the temperature range at the surface from the thermograph records, the time for it to take place and the range as we found it by our readings for any couple at known depth, we computed and solved the term h. Now for normal dry soil, $h = .055$, approximately. We found values from .052 to .058. Considering that the soil varied in moisture content as well as quality, we considered these quite accurate values for the diffusivity. You might be interested in the time lag between points in the ground. For this we have another formula attributed to the same men as before mentioned.

"It is:

$$t = \frac{x}{2h} \sqrt{\frac{T}{\pi}}$$

Here: t = time lag, between two points in the ground (or from zero depth to depth x).

h = the diffusivity as above determined.

T = time duration of a given constant temperature. It may be fairly accurate to consider a certain average temperature during this period, although the variation from this temperature should not be great. This temperature is of course at the surface of the ground.

X = the distance between the two points.

By this formula we may compute the time it would take to get down to say 32 deg. F. to any desired depth when it stays at 32 deg. F. for a week at the surface."

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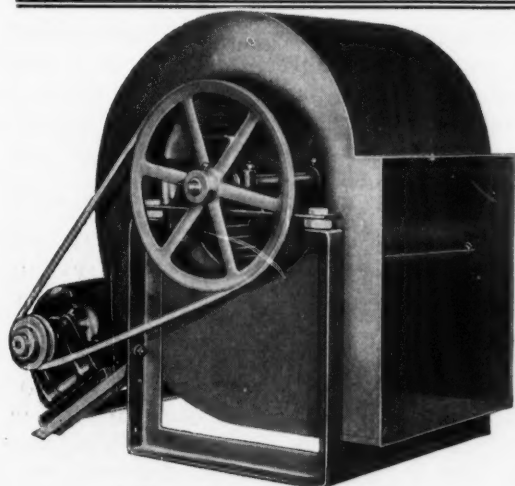
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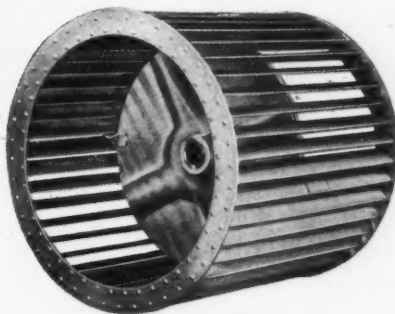
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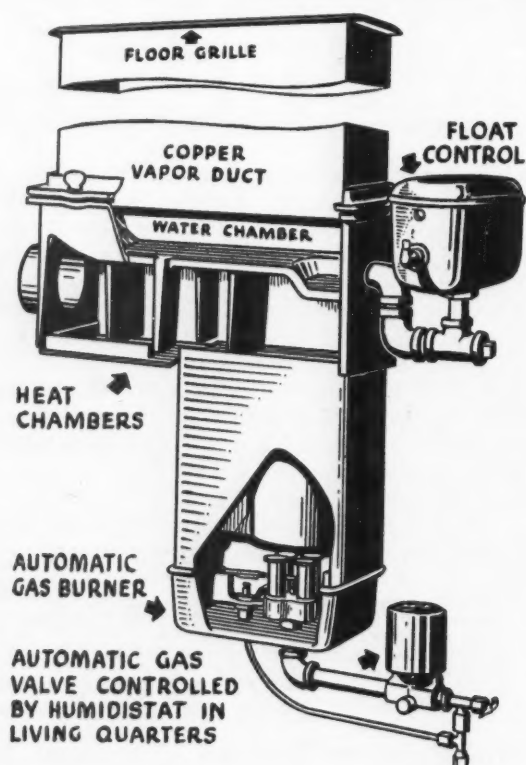
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Humidity Fallacies

(Continued from page 48)

Some idea of inaccuracy may be obtained from Fig. 4 showing charts for the period of February 15 to 19. The recorder was calibrated with the psychrometer at 9:30 AM and started. At 8 AM on February 19 the instrument was stopped and checked. As shown, the recorder said 10 per cent while the psychrometer said 19 per cent. Further, at 8 AM on February 16 the recorder read 62 per cent while the psychrometer said only 42 per cent.

These reports of variations from accurate readings are not submitted to prove that humidity recorders are "all wet." The recorder used on this test was a low priced instrument and was not considered especially accurate. Higher priced instruments used in some of the other tests showed compliance with psychrometers within 2 per cent. It is suggested, however, that any test run with a recorder should be visited several times during the run and checked against a psychrometer. Also any instrument must be handled very carefully and cannot be handled by the home owner.

Fig. 5, recorded by the same engineer with the instrument calibrated every few hours with the psychrometer shows the humidity in a steam heated hotel room on a zero day. There were two water pans hung on the radiator. The reading for the entire day was lower than the instrument would record—that's why the line is so uniform. The relative humidity was below 10 per cent, at least—probably quite a bit below.

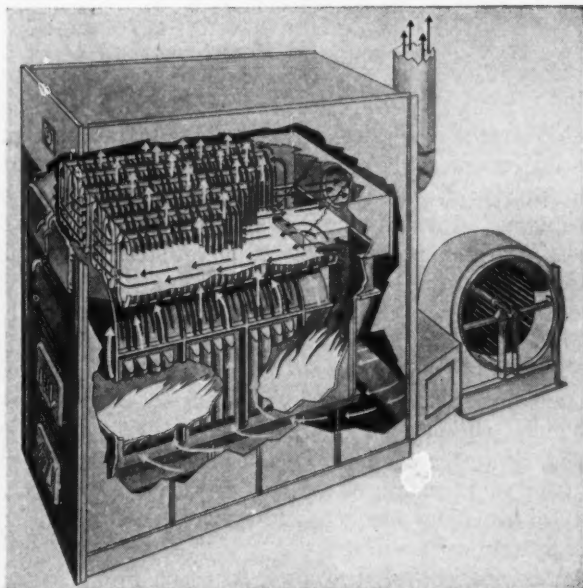
The four charts showing operation from 8 PM February 6 to 6:30 PM on February 10 show what happened in this house during a spell when outside temperatures hovered around 10 below during the evening and night, rising to 20 on the evening of the second day. The recorder was calibrated as each chart was inserted and checked from time to time so that no reading is off more than 6 per cent and an average discrepancy might be taken as 3 per cent "over" for the recorder.

Very evidently this humidifying apparatus in this house did not produce the humidities it was claimed to provide. Also it might be assumed that the gas furnace ran a great deal of the time with weather such as shown.

Data gathered from other tests duplicate in most particulars the results shown in these reports. From the mass of data gathered, it might be said that most of the humidifying apparatus on the market will produce 40 per cent relative humidity if a controlled test is run. In other words, pans will evaporate or sprays will put into the air stream, sufficient humidity to register 40 per cent RH if enough heat is supplied by the furnace.

But under the intermittent operation common to most heating plants some of this apparatus will not produce and maintain 40 per cent RH. Granting that few houses will stand 40 per cent RH without condensation or frost on some windows, the fact remains that too many men are talking about 40 per cent RH without knowing just what is involved.

If the average house and housewife will not stand for 40 per cent relative humidity and if customary operation on and off will not produce 40 per cent RH—why go on talking about it?

The ACME HEATER*"It's in the Fins"*

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Size No.	Dimensions			Grate sq. ft.	Heat Surf. sq. ft.	Free Area sq. ft.		Wt. Lbs.	Max. Capacity Btu.
	Length	Width	Height			sq. ft. Min.	sq. ft. Max.		
7	6'-6"	4'-0"	7'-0"	10.31	260	6.55	10.25	5900	900,000
8	8'-1"	4'-0"	7'-0"	11.91	340	7.73	12.50	7000	1,100,000
9	9'-8"	4'-0"	7'-0"	13.06	430	8.91	14.75	8000	1,300,000
10	11'-3"	4'-0"	7'-0"	14.43	500	15.82	22.62	9300	1,500,000

JUNIOR SERIES

2	4'-6"	3'-6"	5'-8"	3.9	136	4.7	4.7	3200	350,000
3	6'-0"	3'-6"	5'-8"	6.1	183	5.9	6.9	4800	527,000
4	7'-8"	3'-6"	5'-8"	7.2	230	7.1	9.1	5000	634,000
5	9'-0"	3'-6"	5'-8"	9.3	280	8.3	11.3	6000	800,000

Note: For Automatic Firing Add 10% to Ratings Given.

Burns Any Kind of Fuel

The design of an all cast iron, direct transmission heater, such as the Acme, is not dependent upon the kind of fuel to be used. Any type of fuel may be burned. Suitable grates may be provided so that bituminous, semi-bituminous, anthracite coal, or other solids may be used with equal efficiency. Replacement of grates and linings by proper refractory material permits the use of automatic stokers on oil burning equipment.

Large Combustion Chamber

The Acme Heater provides ample space for the ignition of gases of combustion, regardless of the kind of fuel used. The unusually large combustion chamber, acting as "primary" heating surface, effects a very efficient transfer of heat, because of the great temperature difference between the burning gases inside the chamber and the air passing over the outside surface.

Efficient Radiator Section

Although the heating surface of the combustion chamber is large and efficient, still more heat must be extracted to obtain satisfactory overall efficiency. An inspection of the "phantom view" above will reveal how the gases of combustion enter the rear smoke chamber, flow to the front of the heater, and return again to the smoke-box. It is evident that the gases are held in intimate contact with the heating surface, six times the length of the heater, before they are permitted to escape.

High Ratio of Heating Surface to Grate Area

The radiator tubes are covered with extended surfaces, or fins, typical of those used on indirect heating coils. The long, oval tubes of the radiator provide an exceptionally large heating surface and, when combined with the surface of the combustion chamber, afford a remarkably high ratio of heating surface to grate area.

Balanced Construction

The construction of the Acme Heater provides ample free area and allows proper velocity of the air to be heated. Moreover, this air is brought into direct contact with as much heating surface as possible, resulting in the Acme of Efficiency.

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Oil Burners in Research Residence

(Continued from page 46)

which the burner was actually in operation. The oil burner was so adjusted that the hourly heat release was somewhat greater than the hourly heat loss from the house on the maximum day. The hourly heat release in the case of anthracite, however, was just sufficient to offset the hourly heat loss from the house. Hence even on the maximum day the hourly heat release in the case of the oil-burning furnace was greater than that for anthracite, and the curves in Fig. 15a show that, although the combustion efficiencies for the oil-burning furnace and the anthracite were the same at the same heat release, during the actual periods of operation the flue gas loss was greater and therefore the combustion efficiency was less for the oil-burning furnace than it was for the anthracite. Since the rate of oil input remained the same for all weather conditions it is therefore evident that the oil-burning furnace always operated at a less combustion efficiency than the anthracite during the periods of actual operation. The net flue gas loss during a 24-hour period would be determined by the product of the hourly flue gas loss during the actual operating period and the total hours of burner operation during the day. The calculated values of net flue gas loss shown in Fig. 15b were derived from the data presented in Fig. 15a and are consistent with the experimental data for the heat inputs shown in Fig. 14 in that the curves representing higher flue gas losses in Fig. 15 correspond in position with those

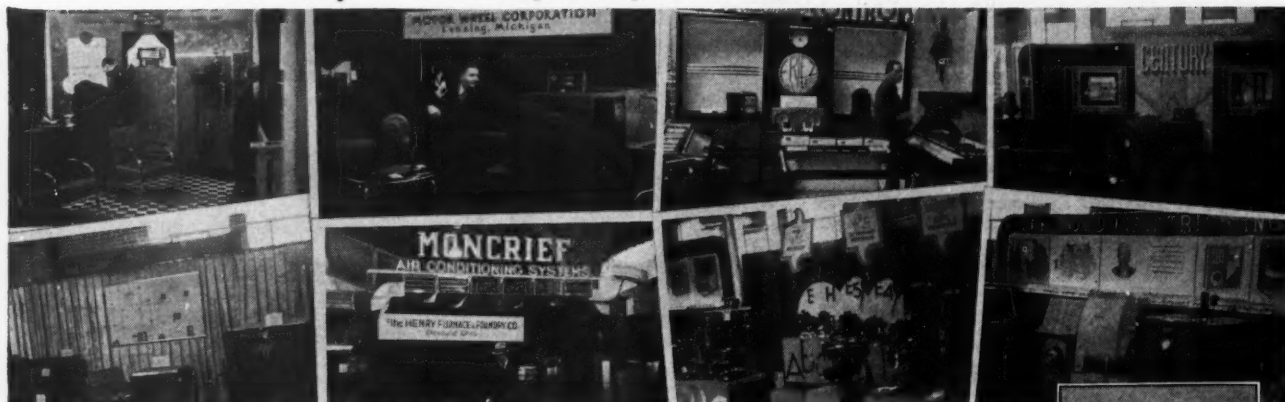
representing the higher heat inputs in Fig. 14. It is the total amount of the net flue gas loss over a given period of time rather than the combustion efficiency alone, that determines the relative position of the curves of heat input shown in Fig. 14.

Minimum Flue Gas Loss

This analysis of the factors affecting the net flue gas loss indicates that in order to secure minimum flue gas losses from an oil burner, the flue gas temperatures and the weight of the products of combustion should be maintained at a minimum value. This condition can be most nearly approached by adjusting the rate of oil input so that the heat release just offsets the heat loss from the house in the most severe weather. This analysis also suggests that if the rate of oil combustion could be varied to conform at all times with the heating demands of the house, an overall efficiency equal to that obtained with anthracite should be possible of attainment. Since the combustion efficiency is affected by the amount and location of the heating surfaces, the necessity of providing adequate and effective heating surface is apparent.

A comparison of fuel costs, based on prices paid in Urbana, Illinois, for an average heating day is of interest. From Fig. 14 for an indoor-outdoor temperature difference of 33 F the values of heat input per day were 1,830,000 Btu, 1,600,000 Btu and 1,470,000 Btu for the conversion unit, the oil-burning furnace and anthracite furnace respectively. Based on unit fuel costs of 7.0 cents per gallon for oil having a calorific value of

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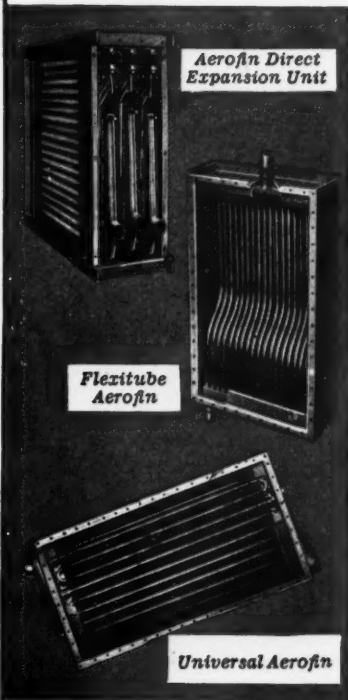
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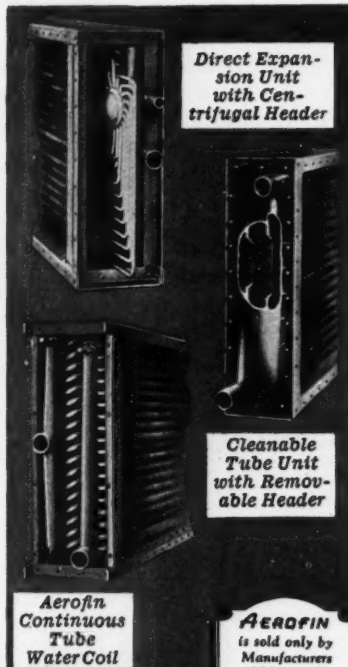
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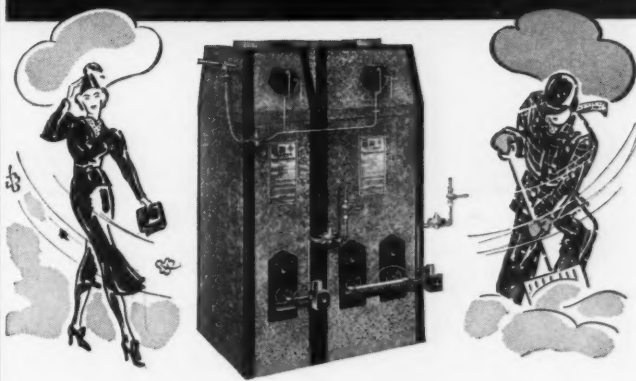
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144,200 Btu per gallon, the cost per therm is 4.85 cents. For anthracite costing \$16.50 per ton, having a calorific value of 13,200 Btu per pound the cost per therm is 6.25 cents. The daily fuel costs based on these unit costs are given in Table 3.

It may be noted that the fuel costs for an average heating day were 77.6 cents, 88.8 cents, and 92.0 cents for the oil burning furnace, the oil conversion unit, and anthracite, respectively. These cost comparisons, of course, are valid only for the unit cost of fuels listed in the table and apply to prices paid in Urbana, Illinois.

Conclusions

The following conclusions may be drawn as applying to the Research Residence and the conditions under which the tests were conducted.

(1) The capacity and efficiency of oil-burning, warm-air furnaces are dependent upon seven factors:

1. Type of burner

Table 3—Relative Fuel Costs for an Average Heating Day

(See Fig. 14)

(Based on prices in Urbana, Illinois)

	ANTHRACITE	OIL-BURNING FURNACE	OIL CONVERSION UNIT
Unit cost of fuel.....	\$16.50 per ton	7 cents per gallon	
Calorific value	13,200 Btu. per lb.	144,200 Btu per gallon (19,500 Btu per lb.)	
Cost per therm* in cents.	6.25	4.85	
Heat input for 33 F. temp. diff. per 24 hours	1,470,000 Btu. 14.7 therms	1,600,000 Btu. 16.0 therms	1,830,000 Btu. 18.3 therms
Fuel cost for average day, in dollars	0.92	0.776	0.888

*One therm is equivalent to 100,000 Btu.

2. Rate of oil input
3. Percentage of CO_2 in flue gas
4. Condition of draft in combustion chamber
5. Amount and location of heating surfaces
6. Size and shape of combustion space
7. Quantity of circulating air.

(2) With a constant percentage of CO_2 in the flue gas, and a constant rate of oil input, the efficiency and capacity of the furnaces using oil as a fuel were increased when the quantity of air circulated was increased.

(3) With a constant quantity of air circulated and a fixed rate of oil input to the furnaces using oil, the capacity and efficiency of the unit were not materially increased when the CO_2 content in the flue gas was increased from 9.5 per cent to 11.5 per cent.

If furnaces using oil as a fuel are provided with sufficient effective heating surface for a given rate of oil input, so that the temperature of the leaving flue gases will be low, then the unit may be expected to perform satisfactorily under diverse conditions of installation in the field, even with fairly wide deviations in the adjustment of the fuel-air ratio for the oil burner.

(4) Under normal service conditions, the operation of the burner for relatively short periods, during which a high rate of combustion was maintained, was not as good from the standpoint of fuel economy as the operation of the burner for longer periods, during which a lower rate of combustion was maintained.

Furnace Manufacturers FOR 1938

Use new Furblo Blowers
OR FURBLO WHEELS AND HOUSINGS

RUBBER INSULATION? Not in Furblo Blowers. They're so minutely machined, so accurately balanced, that no sound insulating materials are needed or used.

BECAUSE we make highest quality blowers, wheels and housings.

LONG EXPERIENCE enables us to guarantee all our factory-assembled blowers for 5 years.

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IMPROVED PRODUCTION
METHODS ENABLE US
TO QUOTE YOU LOWER
PRICES FOR 1938!

COOK Announces



A Complete Line of WARM AIR FURNACE SWITCHES

FOR FAN, BLOWER, AND LIMIT CONTROL AT LINE
VOLTAGE AND LOW VOLTAGE

Cook is proud to present a completely new line of switches—with important improvements that make installation more simple and easy and increase the efficiency and dependability of their performance.

The new Cook Switches give you a better product to sell and the opportunity to assure your customers highly satisfactory performance.

Write today for complete information about the following new Cook Switches.

- No. 101 LINE VOLTAGE BLOWER SWITCH
- No. 102 LOW VOLTAGE BLOWER SWITCH
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- No. 104 LOW VOLTAGE LIMIT SWITCH

COOK CONTROLS

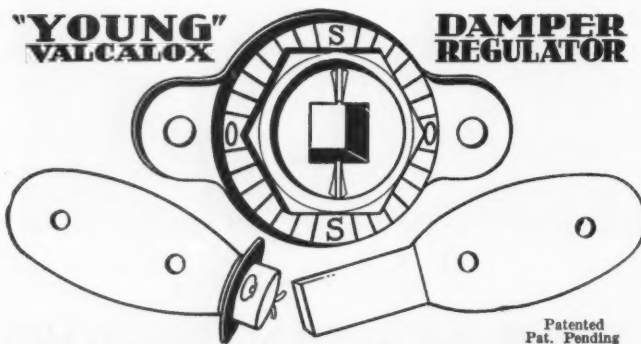
THERMOSTATS—FURNACE LIMIT CONTROLS
ZONE CONTROLS—BLOWER CONTROLS

COOK ELECTRIC CO.
2672 Southport Ave. CHICAGO

Check this **new** DAMPER REGULATOR

with
many SUPERIOR
FEATURES

Check below the many outstanding features in the New "Young" Valcalox Damper Regulator. It locks securely; 231 serrations on dial and base **POSITIVELY** prevents slipping of damper; and position is clearly indicated by degrees **AT ALL TIMES**. No handle left on to encourage tampering. You can balance your system quicker, and it will stay balanced longer. This reduces complaints and call-backs to the minimum. **JUST TRY THEM ONCE AND SEE FOR YOURSELF.**



16¢ and 22¢ each

5/16" square rod Regulators are 16c each—with bearings, rivets, and screws, 22c each. Net trade prices. Also made in 3/8" size. Come packed twelve in a box with one wrench.

Check THESE POINTS!

1. Locks Securely
2. Friction Shoe—No Slipping of Damper
3. Sleeve to Receive Bearing or Bar
4. Positive Action
5. Indicates Position of Damper at ALL Times
6. Can Be Placed on ALL Styles of Dampers
7. Can Be Placed on Partition Wall or ANY Location of Duct
8. Rotates—360 Degrees
9. Base Is Zinc Alloy—Eliminates Corrosion on Movable Parts
10. Bearings Permit Easy Installation of Dampers in Small Ducts
11. Wrench, Bearings, Screws, and Nuts Are Cadmium Plated
12. Placed on Bearing with Pressed Fit—NO VIBRATION

JUST TRY THEM ONCE AND SEE FOR YOURSELF

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5th International Heating & Ventilating Exposition
New York, N. Y., January 24-29, 1938

Ask Your Jobber or Write

YOUNG REGULATOR CO.
4500 Euclid Ave., Cleveland, Ohio

(5) Seasonal operating costs of an oil-fired, forced-air heating system based only on the cost of fuel may be misleading, since the total cost of operation including the electrical costs should be considered.

(6) For an average heating day, or a day on which the indoor-outdoor temperature difference was 33 F, the requirements of the oil-burning furnace as compared with the requirements of the conversion unit showed a net reduction in fuel oil of 11.5-lb per day and a net reduction in electrical energy of 0.2 kwhr per day.

(7) For the same weather conditions, the heat inputs to the furnace were less and the overall efficiencies were greater for anthracite than for oil.

The temperature of the flue gases alone is not a reliable index of combustion efficiency when comparing different fuels. In fact, the total amount of the net flue gas loss during a 24-hour period, rather than the combustion efficiency alone, determines the magnitude of the heat input required to maintain house temperatures.

(8) Based on unit costs of 7 cents per gallon for fuel oil and \$16.50 per ton for anthracite, the fuel costs for an average heating day, or a day in which the indoor-outdoor temperature difference was 33 F, were 77.6 cents, 88.8 cents, and 92.0 cents for the oil-burning furnace, the oil conversion unit, and the furnace burning anthracite, respectively.

Acknowledgments

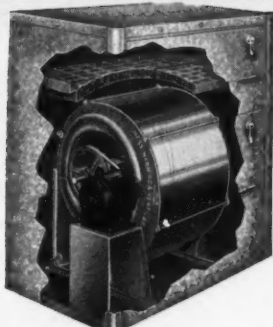
The results presented in this paper were obtained in connection with the investigation of warm-air furnaces and heating systems in the Research Residence⁶, Fig. 1, at the University of Illinois, conducted by the Engineering Experiment Station of which M. L. Enger, Dean of the College of Engineering, is the director, in the Department of Mechanical Engineering of which O. A. Leutwiler, Professor of Mechanical Engineering Design, is the head. This investigation is a cooperative project sponsored jointly by the *National Warm Air Heating and Air Conditioning Association* and the Engineering Experiment Station. These results will ultimately comprise part of a bulletin of the Engineering Experiment Station. Acknowledgment is also due to J. S. Cunningham, former Research Assistant, for services rendered in connection with the investigation, and to the various manufacturers who cooperated by furnishing instruments and equipment.

⁶The Research Residence in Urbana, Ill., was built, furnished, and completely equipped specifically for research work in warm-air heating by the *National Warm Air Heating and Air Conditioning Association* in December, 1924.

A building permit has been issued for construction of a sheet metal shop at 1163 East Florence Avenue, Los Angeles, for William Heldoorn, of 739 East Manchester Avenue, that city. The structure will have ground dimensions of 34x115 feet, and will cost about \$3,000.

The Thomas Heating Company, Incorporated, of Racine, Wisconsin, has opened a branch office at 142 S. 14th Street, La Crosse, Wis.

William Heldoorn has let the contract for erection of a sheet metal shop at 1162 East Florence Avenue, in the Florence District of Los Angeles, California, to cost \$3,000.

**QUALITY
EQUIPMENT--FROM
HESS-- COSTS LESS****INCREASE
WINTER
BUSINESS**

Change over old gravity jobs to modern, automatic, forced air heating with the Hess Blower Filter Unit and our automatic oil burner or coal stoker.

Hess Blower Filter Units are priced low and are completely factory assembled. Many features make this unit an outstanding value.

Hess and Benefactor welded steel furnaces give the greatest values for the least cost. Hess Oil Burners and Coal Stokers are unsurpassed for automatic heating.

WRITE FOR DEALER PORTFOLIO
HESS WARMING & VENTILATING CO.
1211-27 S. WESTERN AVE. Founded 1873
CHICAGO, ILLINOIS

Now

IS THE TIME TO INSTALL "All Season"

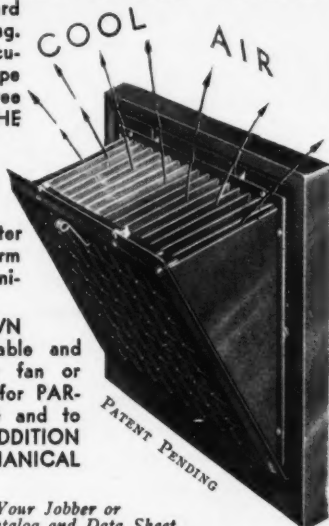
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The "ALL SEASON" COMBINATION HEATING and COOLING REGISTER has solved the register problem for WINTER and SUMMER air conditioning installations.

In the OPEN position for summer COOLING, as illustrated, the cool air is forced upward to impinge on the ceiling. The center vane is perpendicular, the others gradually slope each way to a 45 degree angle, thus DIRECTING THE AIR FLOW each way as it leaves the REGISTER.

The register in the CLOSED position with the shutter open for winter heating DIRECTS the warm air across the floor in a uniform flow.

It is the ONLY KNOWN DEVICE of its kind available and should be used on every fan or blower heating installation for PARTIAL SUMMER COOLING and to PROVIDE FOR FUTURE ADDITION OF COMPLETE MECHANICAL COOLING.



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*Modern Homes are
Air-Conditioned by*

SELECTAIR

● DESIGNED and built by the S. T. Johnson Co., pioneer manufacturers of Oil Burners, this smart new air-conditioner combines in one compact unit every feature desired by home-owners, architects and engineers for economical heating, air-conditioning and ventilating the modern home. Year-round hot water. Forced air circulation for summer. Equipped with the popular BANKHEAT Pressure-Type Burner. Furnished in enamel with chrome trim.

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S. T. JOHNSON CO.

Oil Burners

940 Arlington Avenue, Oakland, California
401 Broad Street, Philadelphia, Pa.

● THERE'S A JOHNSON OIL BURNER FOR EVERY PURPOSE

PRECISION

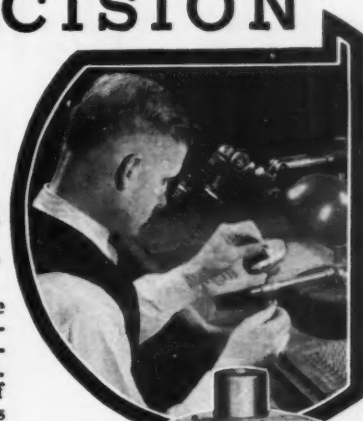
In Air Conditioning and Refrigeration Controls . . .

Holes that look like caverns under a microscope are imperceptible to the naked eye. But this is just ONE of the many precise tests demonstrating the care and skill in the precision manufacture of every A-P Air Conditioning and Refrigeration Control.

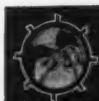
Detail? Yes. But all necessary to keep A-P Controls up to the standard of efficient and accurate dependability that Refrigeration Experts have learned to expect from ALL A-P Controls.

That is the reason you may depend upon A-P Controls for your most particular installation. Write for the latest bulletins on A-P Controls.

Progressive Jobbers Everywhere Stock
A-P Controls



No. 210
Expansion
Valve

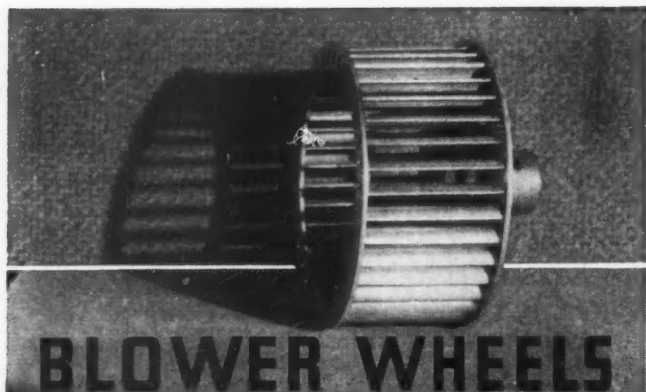


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MILWAUKEE

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Precision Standards Applied to Quantity Production

For furnace manufacturers who buy wheels only, Clarage offers any size desired, and can meet any quantity requirement. Clarage Wheels can be furnished standard width, or any percentage of standard width to deliver a specified volume of air at any operating speed. All wheels are PERFECTLY BALANCED for quiet operation without vibration.

Clarage Furnace Fans (complete assemblies) combine many advantages. They are positive centrifugal type, very compact, highly efficient, and the low speeds insure SILENT OPERATION.

Write for complete information and price schedules.



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AIR CONDITIONING
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FANS & BLOWERS FOR
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SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES



Variable Pulley

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No idle talk, that slogan! And we mean just what we say when we quote it too! You'll have to keep your eyes wide open and be constantly on the jump for 1938's business opportunities. You'll want a pulley that stays on the job night and day, one that will perform to the owner's satisfaction. You don't have to worry about anything when you install a Congress Pulley. We have them in every type and size to meet your requirements. Drop us a line for more information.

CONGRESS TOOL & DIE CO.

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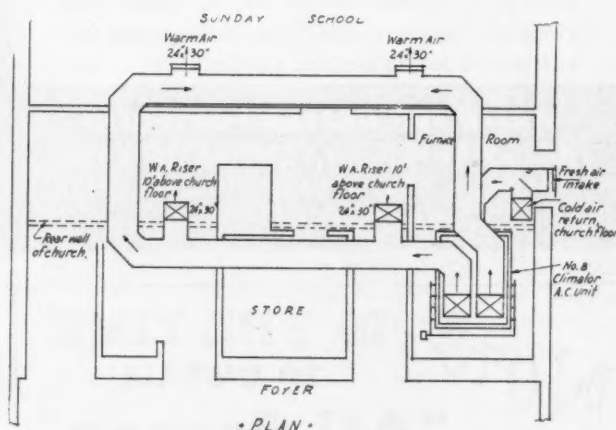
A. C. in New Zealand

(Continued from page 51)

from our factory. As new territory was broken we sent up a new steel seaming rail which was then stored at the local gas company's works ready for the next job in that territory.

Under these circumstances we found that the loop type of ducting not only gives a much more even distribution of either warm or cold air, but enables us to standardize on a comparatively few sizes of ducting and fittings. Furthermore, since our Humidaire furnace is built of interchangeable units irrespective of size we can give immediate delivery of any sized installation out of stock.

For booster fans we use an aluminum blower-rotor which we build into our own housing and fittings, but latterly we have designed our own rotor which on test is somewhat more efficient and costs considerably less. These fans are built into a sectional, silent fan-box made up of steel-framed



A "loop" system with "loop" at ceiling and passing through service rooms. Risers to church (upstairs) are built into pilasters at back of church.

"Celotex" the components of which are also interchangeable. Fractional hp. motor squeal and vibration is avoided by mounting the motor on a forty-pound cast iron base with rubber feet which gives proper tension on the V-belt and avoids the necessity of bolting down the motor.

Up to this point we had dealt with most of the more important problems and were in a good position to handle most conditions likely to be met with. In making our sales we did not attempt to call any type of installation out of its name, and it soon became known that when we offered a fully automatic air conditioning system, we meant just that. For instance:

A forced air system with re-circulation only we call Forced Warm Air Heating. A forced air system with alternative outside fresh air we call Forced Air Heating and Ventilation. Add a Mistaire air washer and we call it Forced Air Heating, Ventilation and Cooling. Add a Viscaire air filter to the

(Continued on page 74)



**AIR-LITE
CEILING UNITS**

THESE unique units furnish both ventilation and illumination in one fixture. Attractive in appearance, an adequate light source, and an effective means for uniform, diffused, air distribution. A feature of the famous UNI-FLO line.

GRILLES **uni-flo** REGISTERS

BARBER-COLMAN COMPANY
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**THE PUBLIC DEMANDS
QUALITY!**

**CHALMERS
HAS IT**



17 YEARS of active experience! Used widely in America, Europe, Asia and Africa. Carries Underwriters and New York City approval. Used by the U. S. Government. Adapted to Boiler-Burner and Furnace Units. New literature available for interested dealers — Write today.



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FAN BUYERS

Our new "Selective Series" Bulletin is just off the press

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Contains pressure-volume characteristics of over 200 fans in all sizes from 8" to 10' and static pressures up to 3" w. g.

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Visit our booth, No. 215, at the coming International Heating and Ventilating Exposition, January 24-28.

NEW

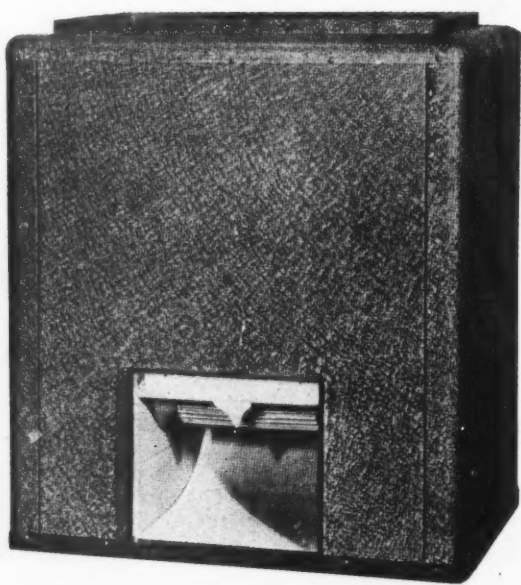
**IMPROVED
MILES
JUNIOR
Air
Conditioner**



**ATTACHES to any
gravity furnace.**
Provides circulating, filtered air. Extra comfort for the home owner. Extra profit for you. Write for circular.

**POSITIVELY QUIET
OPERATION**
★
**FOUR FILTERS
EXTRA CLEANING
CAPACITY**
★
**3-SPEED HEAVY-
DUTY MOTOR**

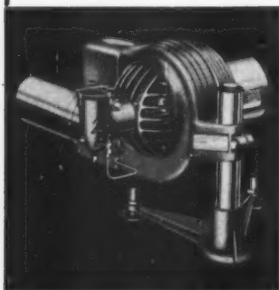
The HENRY FURNACE & FOUNDRY Co.
3473 E. 49th St. • CLEVELAND, OHIO

"GOLDEN ROD" BLOWERS

Sell this Beautiful Streamlined package Unit. High in efficiency—Low in price, Green Feather-weave finish. Sizes up to 4,000 cfm.

Also a complete line of sizes of utility Twin and base type models. Ask your distributor or write direct to

F. Jaden Manufacturing Company
HASTINGS, NEBRASKA

THREE GREAT TRADE-MARKS

To carry these three great trade-marks a product must be good.
"Gentl" equals Quality Oil Burners
"Underwriters" equals Safety
"O. B. I." equals High Standard
When you sell Nu-Way Products, you sell these three great trade-marks.
Write today and let us tell you about your possibilities with Nu-Way.

THE NU-WAY CORP.

ROCK ISLAND

ILLINOIS

**"HOME COMFORT"
FURNACE & MFG. CO.**

... for all your heating requirements. We have a well-built line of furnaces and modern air conditioning units, simple to install, economical in operation and constructed for a lifetime of superb heating service. Write today for further information.

"HOME COMFORT" FURNACE & MFG. CO.
2901-11 ELLIOT AVE. ST. LOUIS, MO.

**Reducers
and Offsets**

(Continued from page 52)

at s and r. Using s and r as centers with any desired radius, intersect arcs at f. Draw the miter line from f through a indefinitely.

Now from the various corners, 1 to 4, in section A in plan draw lines at right angles to A-C, until they intersect the miter line f-1 as shown by similar numbers 1-2-3 and 4. This completes the true elevation of the upper collar 1-3-L-O and is all that is necessary in laying out the three pattern shapes. If the true elevation of the full offset is desired, then the lower miter line can be drawn similar to that shown for the upper one. Lines drawn from the corners in section C intersect the lower miter line as shown. L-M-N-O shows the completed true elevation of the offset, but as above stated, only 1-3-L-O is necessary for the complete set of patterns.

Take the girth of the section A or 1-2-3-4 and set it off on the horizontal line at the upper right as shown by similar numbers. From these points 1-2-3-4 and 1, at right angles to 1-1 draw lines indefinitely as shown. Now measuring in each and every instance from the line O-L in the true elevation take the various distances to points 1-2-3 and 4 and set them off on corresponding numbered lines in the pattern, measuring in each and every instance from the line 1-1. Connect the intersection thus obtained and $1^{\circ}-2^{\circ}-3^{\circ}-4^{\circ}-1^{\circ}$ will be the desired miter cut and $1-1^{\circ}-1^{\circ}-1$ the pattern for 1-3-L-O in the true elevation.

If the duct is of a small size, the three patterns can be laid out on a rectangular sheet of metal without waste, making allowance of course for seaming or riveting the horizontal or cross joints. Simply take the distance of a-b in the true elevation and set it off from each point on the miter cut 1° to 1° in the pattern and obtain the miter cut shown from 1° to 1° . Now take the shortest distance in the upper miter cut from 3° to 3 and set it off from the lower miter cut from 1° to 1° and 1° to 1° and draw a line from 1° to 1° which completes the desired net patterns.

Small and Large Ducts

If the duct is of a large size, the offset can be made with longitudinal or vertical joints and the patterns for the various sides of the duct will be developed, using the patterns parts just obtained.

Take a tracing of P and set it off at the left as shown by P° . Now take a tracing of R and join it to P° as indicated by R° . In a similar manner take S and place it on P° as shown by S° .

$R^{\circ}-P^{\circ}-S^{\circ}$ is then the pattern for the two wide sides of the offset. Slight bends are made as shown by the dots on the solid line to conform to the angles shown in the true elevation. Edges must be allowed for the Pittsburgh locks.

In a similar manner obtain the pattern shape for the two narrow sides of the offset. U-T and V from the three pieced pattern shapes are reproduced and joined as indicated at the left by $U^{\circ}-T^{\circ}$ and V° . In using the vertical patterns turn one side upside down,

**N
E
W**

Everybody Has
Enough Money
to Buy This New
Peerless
Unit. • It's Good.

Get full information
now and watch YOUR
Sales Grow...

FAN &
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Write for Bulletin SDA-44 and prices.

THE PEERLESS ELECTRIC CO.
WARREN, OHIO

THE ONLY TRAINING PROGRAM

Actually Supervised

BY A MANUFACTURER-APPOINTED
BOARD OF GOVERNORS

● It should mean a great deal to an employer faced with the problem of building a capable and dependable organization, to know that a selected group of hand-picked men are being prepared for Refrigeration and Air Conditioning work thru a Training Program which is *actually supervised* by FACTORY ENGINEERS WORKING IN THE INDUSTRY, delegated to do so by some of the 70 leading manufacturers who are "officially" endorsing and recommending this Training Program.

This vitally important point is proof of the fact that the Refrigeration & Air Conditioning Institute is training men just the way the Industry wants them trained—exactly as these manufacturers would train them if they were doing the job themselves. As a leading manufacturer recently put it—"What you are doing is creating a new type of Craftsman,—the kind of trained man so badly needed in this Industry, today."

Yes! R-A-C-I graduates are a "new type of Craftsman." They know every phase of heating, ventilating, and cooling as applied to air conditioning—know it from the practical as well as the theoretical standpoint. Under the supervision of some of the Industry's best engineers they have been trained, by us, to do the things you as an employer want them to do—properly install, service and repair. In fact, many of our graduates are capable of doing even more responsible work—capable of stepping right in where the Application Engineer leaves off, and make work what that Engineer has installed.

The record of every man trained by the Institute,—including his photograph, our rating of his ability, what his references had to say about him,—everything, in fact, that you as an employer would like to know,—is available upon request—without obligation.

If you do not have a copy of the Institute's "Report to the Industry"—a 200-page cloth-bound book with 17 big photographs—please ask for it on your letterhead.

Raymond Smith
PRESIDENT

REFRIGERATION & AIR CONDITIONING
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End your BEARING PROBLEMS

● Solving your bearing problems is our job—a job begun 31 years ago. The experience gained in the years following through practical and experimental research has enabled us to manufacture an efficient and long-lived pillow block. With Randall Pillow Blocks built into your units, you are assured of freedom from bearing problems. Try them and assure yourself of their faultless operation.

Randall Pillow Blocks are self-aligning, self-lubricating and operate with low running torque. They are quiet in operation with no metallic bearing noise. Made in various types and sizes to fit many different applications.

Write for complete information and catalog.



Randall Standard Pillow Block

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No Master product is ever made available until its accuracy and dependability have been completely proven. The model B-22 has proven its dependability not only in our exhaustive tests, but in use under actual operating conditions in the many years it has been sold and installed all over the country.

TYPE B-22



A two position heat regulator that is ideal for the small home. It is sturdily made and dependability and precision are built right into it. A noiseless device that will outlast the heating plant.

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MASTER
HEAT REGULATOR

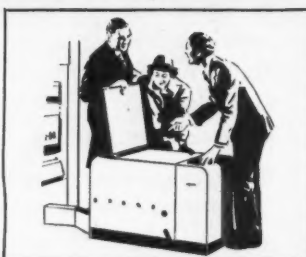
AN ALL PURPOSE AIR VELOCITY METER

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**Instantaneous-Direct Reading
No Timing
No Calculations
Write for Folder****ILLINOIS TESTING LABORATORIES, INC.**
412 No. La Salle St. Chicago, Illinois**ECONOCOL**

Join the nation's fastest growing industry by lining up with Econ-O-Col. It's the leader in performance, low upkeep, appearance, and value. Write today for details on profitable, exclusive dealer franchise.

ECON-O-COL STOKER DIVISION OF
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**STOKERS****ATTRACTIVE PROPOSITION—
ON THE NEW PEERLESS LINE**

The new Peerless line of coal, coke, oil and gas furnaces for manual or automatic firing, offer dealers an exceptional sales and profits opportunity. These new furnaces have "everything." Beauty, unusual efficiency, low operating costs. Many improved features including self-contained blower and filters. More perfect combustion. Model shown in illustration burns coal or coke. Ask for literature, prices and discounts to the trade. Write today.

PEERLESS FOUNDRY COMPANY
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Conversion Oil Burners
Boiler-Burner Units
Zeph-o-lator Warm Air
Conditioning Furnace Units
Hot Water Heaters

Flouting Flame

CENTURY ENGINEERING CORP. CEDAR RAPIDS, IOWA

for the opposite side. In other words if R° is at the top on one side, it will be at the bottom for the other side. The same applies to the pattern for the narrow side.

Large Size Offsets

When offsets have large dimensions one would not make full size drawings, but would use a divisor and multiplier in the following manner: Assume that the duct size was 18x30 inches and there was a 36-inch projection from A to B and from B to C and that the vertical heights of the three pieces E°-D° and F° in the true elevation are 12, 36 and 12 inches respectively.

Knowing the above given dimensions, 6 or any other

$$\begin{array}{r} 18 \times 30 \\ \text{number could be used as a divisor. Then } \frac{\quad}{6} = \\ 12, 36, 12 \\ 3 \times 5; \frac{12}{6} \text{ inch (projections)} = 2: \frac{36}{6} \text{ (vertical heights)} = 2, 6, 2. \end{array}$$

The patterns would now be developed on a one-sixth scale as just described and enlarged six times *direct on the sheet metal*.

For example: Assume that P or any other of the net patterns was laid out one-sixth full size. Then to obtain the full size pattern—for P in practical work, take 6 times the length of 1°-1°; also 6 times the width of 1°-w or 1°-x. Square off 1°-w and 1°-x at right angles to 1°-1° and place 6 times the projection of w-2° at the top and x-2° at the bottom to complete the full size pattern for the section P, or P° at the left.

**A. C. in
New Zealand***(Continued from page 70)*

above and we call it Modern Automatic Air Conditioning.

Incidentally all our gas fired or stoker fired plants are fitted with complete automatic controls with the usual type of safety cut out in case of pilot failure. The fan is controlled by a fanswitch so that it will only start when the furnace is hot and will stop only when furnace is cooling off.

One point in the nomenclature of installations in the U. S. meets with our strongest disapproval and that is the loose way in which the term "Air Conditioning" is being handled. I notice that a simple booster fan with a couple of filters is called by some manufacturers an "Air Conditioning Unit." We call such a plant with furnace a "Heating and Ventilating Plant." When we sell "Air Conditioning" we expect properly to cover the functions of heating, cooling, washing, ventilation, humidification and dehumidification. When the purchaser wishes to pay for less than the combination of all these functions, we designate the plant accordingly. It is rather a mystery to us how the U. S. purchaser (a layman) can, other than by price indication, know whether he is buying a real "Air Conditioning Plant" or merely a furnace with a booster fan and filter attached when both types are called by the same name.

**Today's
Opportunity...****For Warm Air
Furnace Men!**

Winter air conditioning with REX AIR-PAK is taking the warm air furnace market by storm! Make this profitable market yours. Write today for new sales plan.

**AIR CONTROLS, INC.**

DIV. OF
The Cleveland Heater Co. 1937 West 114th Cleveland, Ohio

What is left of Your Profit Dollar when you service Humidifiers with Valves that RUST, CORRODE and STICK?



Every THERMO-DRIP Humidifier has a Monel metal valve; when installed, it's isolated from the heat zone of the furnace. Rust and corrosion? Positively avoided with Monel! Liming-up and sticking? That can't happen, either! So, sell THERMO-DRIP—and keep all the profit.

AUTOMATIC HUMIDIFIER CO.

18th and Main Streets • Cedar Falls, Iowa

**Automatic
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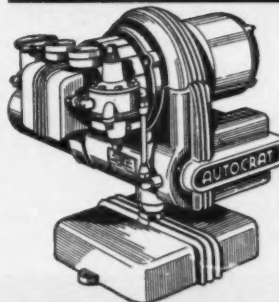
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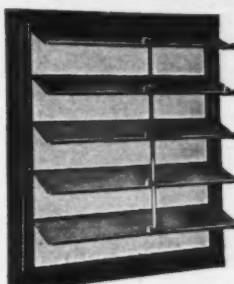
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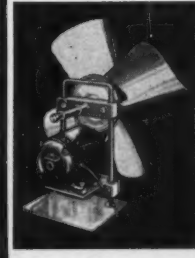
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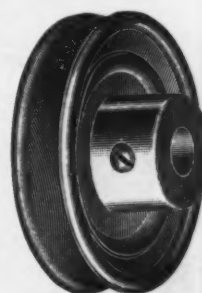
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New Literature

For your convenience in obtaining copies of new Literature, use the coupon on page 98

300—Forced Air Ducts and Fittings

The Excelsior Steel Furnace Co., 118 S. Clinton Street, Chicago, has published a manual of 16 pages and cover covering their forced air ducts and fittings.

301—Quarterly Charts

Grant Wilson, Incorporated, 4101 West Taylor Street, Chicago, says: "The effect of temperatures on business has prompted us to have prepared a chart showing the 65-year average for September, October and November and it also shows the 1936 official temperatures. This may recall to you that had your customers anticipated this kind of weather, your business might have been better."

Daily temperatures this year may be recorded.

302—Thermostatic Control

Spencer Thermostat Company of Attleboro, Massachusetts, has just released a new 48-page catalog showing the full line of Klixon thermostatic controls.

Included in this catalog are electric and gas actuated controls for heating appliances, room thermostats, limit controls for steam, hot water, and warm air heating systems, stoker timers, a number of thermostatic electric switches and cut-outs for built-in applications, thermal relays, self-closing temperature and pressure relief valves for hot water supply systems, etc.

303—"Turn on the Heat"

The Minneapolis-Honeywell Regulator Company, Minneapolis, Minnesota, has just released a new booklet, entitled "And then . . . we turn on the heat." This booklet expresses the reasons why a Minneapolis-Honeywell "Heat Accelerating" thermostat can maintain stabilized room temperature and is written from the layman's point of view. It is directly tied up to a new Minneapolis-Honeywell sound film titled, "Profit or Loss on Burner Sales." An actual reproduction of all frames in the film is included in the booklet along with the accompanying dialogue.

304—What Is Air Conditioning?

Fairbanks, Morse & Co., 900 South Wabash Avenue, Chicago, is distributing a new publication giving a complete and direct answer to the question "What Is Air Conditioning?" "Central System Air Conditioners by Fairbanks-Morse," also contains discussions and illustrations of the various types of air conditioning units, their functions and their applications in office buildings, shops, residences, industrial plants, etc. It provides an excellent source of reliable information on a subject that is often little understood.

Fairbanks-Morse central system air conditioners, available in several models and sizes, are described in detail.

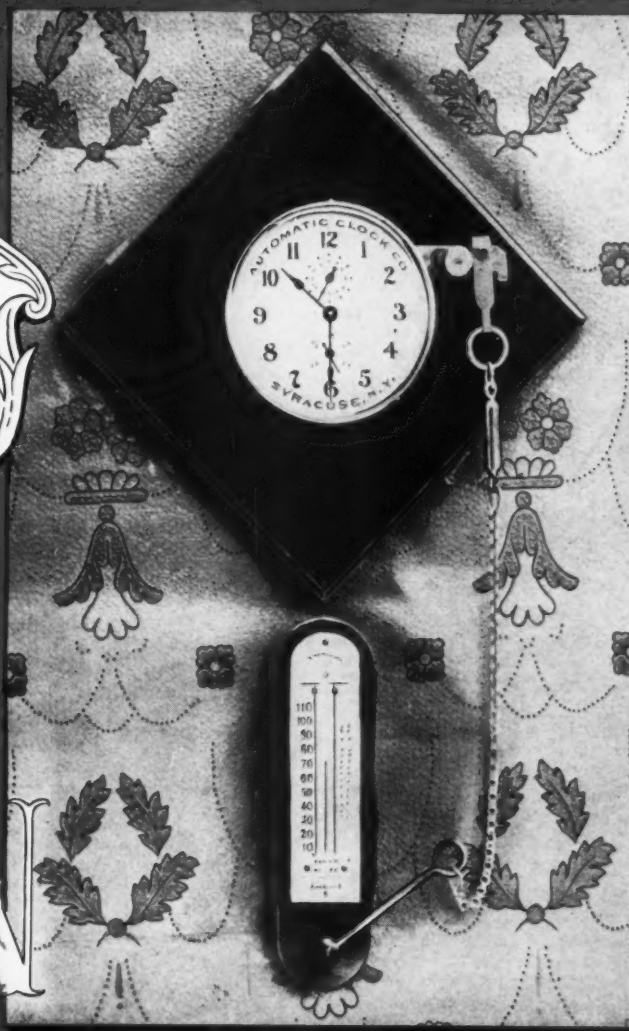
305—A. C. and Heating Equipment

Carrier Corporation, 850 Frelinghuysen Ave., Newark, New Jersey, has released a 12-page booklet describing the Carrier equipment available for industrial air conditioning, refrigeration, and space heating.

The booklet carries pictures and descriptions of the equipment, ranging from a one-room Weathermaker to a self-contained centrifugal refrigerating machine for use in large scale industrial process work and commercial air conditioning installations. A feature of the booklet is an explanation of the conditions under which the equipment best operates.

The equipment listed includes Carrier equipment for small areas, industrial types; large and central plant conditioning systems; outlet grilles for distributing air; Kroy type unit heaters and heat diffusing units; centrifugal machines; refrigeration compressors; evaporative condensers and cold diffusers.

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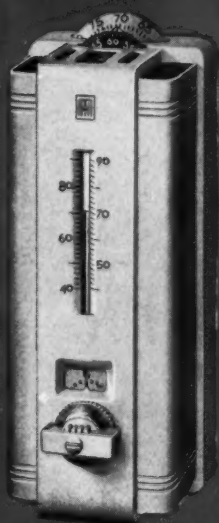


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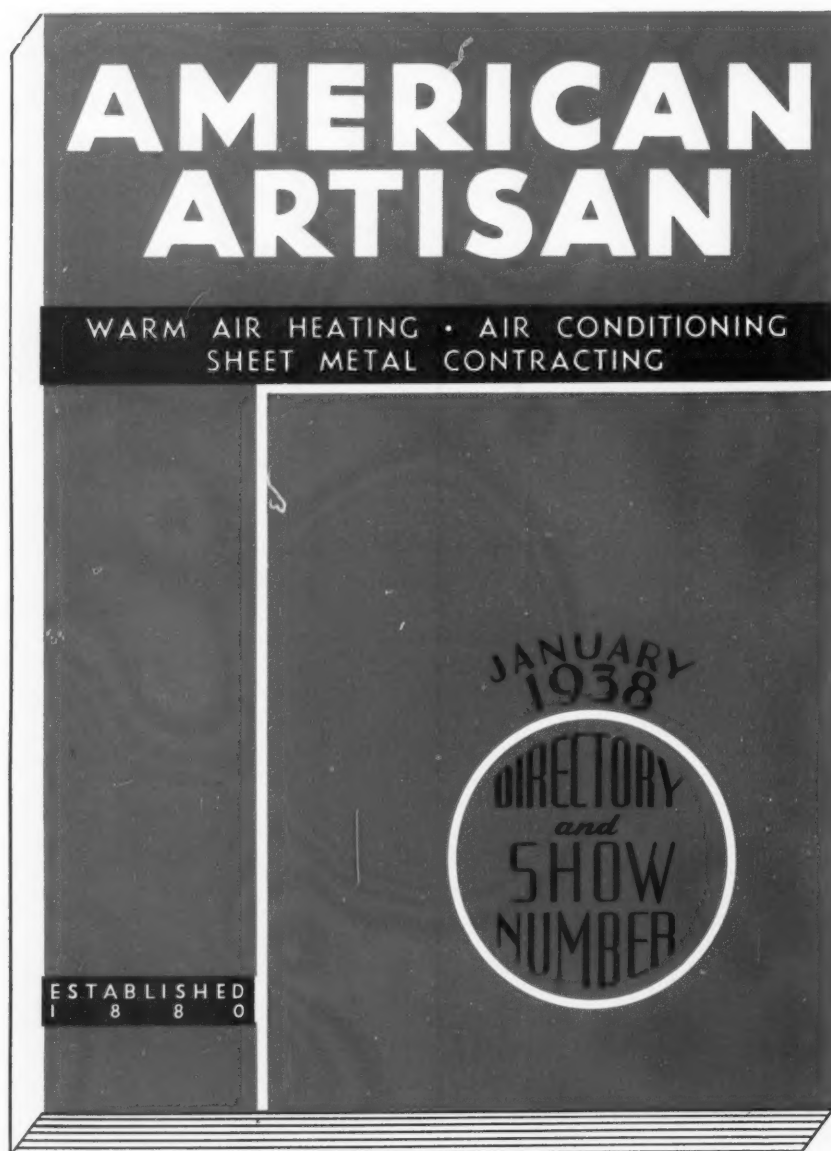
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Editorial Index for 1937

Advertising, Selling, Display

- Where's That Prospect? by R. Louis Towne.....Jan. 37, p 103
 A Window Display, by Lawrence E. Gichner.....Feb. 37, p 23
 You Tell 'Em—but When and How? by R. Louis Towne.....Feb. 37, p 47
 I Am Not Sold, by R. Louis Towne.....Apr. 37, p 68
 Remember—Close Isn't Closed! by R. Louis Towne.....Jun. 37, p 48
 Fall Business (E).....Sep. 37, p 27
 Oil Burners—A Case History of One Firm's 15 Years' Experience, by S. S. Swift.....Nov. 37, p 59

Air Conditioning, Agricultural

- Air Conditioning Applications to Wisconsin Agriculture, by S. A. Witzel.....Oct. 37, p 60
 Bin Drying of Seed Corn.....Dec. 37, p 16

Air Conditioning of Houses

- A Survey of Air Conditioning in Real Estate Developments.....Jan. 37, p 123
 Winter Air Conditioning in a House with 244,000 Btu Loss.....Feb. 37, p 50
 Research Activities in Residential Air Conditioning, by Brewster S. Beach.....Mar. 37, p 76
 Heating a 325,000 Btu House.....Oct. 37, p 66

Air Conditioning, Small Commercial

- Problems of Air Conditioning a One-Story Club Building, by B. L. Schwartz.....Mar. 37, p 66
 Air Conditioning a New Zealand Furnace Works, by H. F. Purcell.....Apr. 37, p 64
 Well Water for Cooling—Coil Heated Air for Heating.....Jun. 37, p 54
 Air Conditioning the New 200 M.P.H. Transports, by J. F. McGuire.....Aug. 37, p 60
 Air Conditioning a Wild Game Canning Plant, by Frank E. Hawkins.....Sep. 37, p 78
 Shoe Store Cooling.....Sep. 37, p 74
 Apartments Cooled with Ice, by E. O. Young.....Sep. 37, p 84

Air Conditioning Theory

- Study Courses in Heating, Ventilating and Air Conditioning.....Jan. 37, p 130
 Michigan State College Forced Warm Air Short Course.....May 37, p 64
 Air Conditioning and Its Effect on Hay Fever and Pollen Asthma, by Wm. H. Welker.....May 37, p 67
 Sinus and Cold Bedrooms.....Apr. 37, p 88
 Cooling by Evaporation, by M. W. Pehl.....Sep. 37, p 82

Architectural Sheet Metal Work

- The Colgate Fleche.....Jan. 37, p 50
 1936 Developments in Metal Buildings.....Jan. 37, p 67
 3,500 Sq. Ft. of Dead Level Roof.....Jan. 37, p 72
 The Metropolitan Museum's (N. Y.) New Metal Roof.....Feb. 37, p 20
 Better Weather Protection—Ridges.....May 37, p 28
 Artificial Patina for Copper (Part 1).....Jun. 37, p 33
 (Part 2).....Jul. 37, p 31
 A Welded Church.....Aug. 37, p 18

Architectural Sheet Metal Work (Cont'd)

- Prefabricated Copper Houses.....Aug. 37, p 26
 Houses of Steel.....Sep. 37, p 35
 Termites, by Thos. E. Snyder.....Sep. 37, p 42
 Termites, by Thos. E. Snyder.....Oct. 37, p 22
 House of Steel and Glass.....Nov. 37, p 25
 Cadaver Tanks.....Dec. 37, p 18
 The Armco Research Laboratory.....Dec. 37, p 28

Association Activities

- 1937 NWAH & AC Assn. Meeting.....Jan. 37, p 165
 Indiana's 18th Annual Convention.....Feb. 37, p 83
 Wisconsin's 23rd Annual Convention.....Feb. 37, p 32
 The Michigan Annual Convention.....Mar. 37, p 32
 The Ohio Convention.....Apr. 37, p 32
 The New York Convention.....May 37, p 95
 Association Activities.....May 37, p 101
 Association Activities.....Jun. 37, p 87, 88
 National Warm Air Association.....Jul. 37, p 32
 Stoker Manufacturers Meet.....Jul. 37, p 108
 Association Activities.....Jul. 37, p 110; Aug. 37, p 95; Sep. 37, p 111; Oct. 37, p 95; Nov. 37, p 102; Dec. 37, p 21
 Sheet Metal Distributors Annual.....Nov. 37, p 93

Authors

- Bailey, E. A.....Jan. 37, p 113; Nov. 37, p 54
 Baybutt, J. W.....Mar. 37, p 28; Aug. 37, p 19
 Beach, Brewster S.....Mar. 37, p 76
 Bober, Wm. C.....Jan. 37, p 53
 Buck, Everett S.....Jan. 37, p 99
 Coyle, Joseph C.....Sep. 37, p 28
 Dingle, Jos. G. Jan. 37, p 64; Feb. 27, p 24; Mar. 37, p 30; Apr. 37, p 27; May 37, p 31; Jul. 37, p 22; Aug. 37, p 28; Sep. 37, p 30; Oct. 37, p 30; Nov. 37, p 32; Dec. 37, p 32
 Duffee, F. W.....Dec. 37, p 16
 Fahnestock, M. K.....Jan. 37, p 120; Apr. 37, p 55; May 37, p 62; Jun. 37, p 57; Jul. 37, p 51
 Frost, L. H.....Mar. 37, p 24; Apr. 37, p 28; Jun. 37, p 25; Sep. 37, p 44
 Gichner, Lawrence E.....Feb. 37, p 23; Sep. 37, p 46
 Haines, W. R.....Feb. 37, p 30
 Hawkins, Frank E.....Jul. 37, p 28; Sep. 37, p 78
 Hyatt, L. F.....Aug. 37, p 23; Nov. 37, p 30
 Jeske, R. F.....Apr. 37, p 20; May 37, p 22; Jul. 37, p 24; Sep. 37, p 40; Oct. 37, p 28; Nov. 37, p 28; Dec. 37, p 26
 Jones, David C.....Sep. 37, p 32
 Jordan, Paul R.....Aug. 37, p 58
 Kaiser, E. R.....Mar. 37, p 64
 Konzo, S.Jan. 37, p 108; Mar. 37, p 60; Mar. 37, p 69; Feb. 37, p 54; Apr. 37, p 60; Apr. 37, p 66; May 37, p 57; Jun. 37, p 52; Jul. 37, p 60; Aug. 37, p 48; Sep. 37, p 75; Oct. 37, p 53; Oct. 37, p 62; Nov. 37, p 51; Nov. 37, p 62; Dec. 37, p 45
 Kratz, A. P.Oct. 37, p 53; Nov. 37, p 51; Dec. 37, p 45
 Kroeker, J. Donald.....Jan. 37, p 124
 Kruckman, Arnold (Washington Letter).....Oct. 37, p 24; Nov. 37, p 26; Dec. 37, p 24
 Laws, George H.....Mar. 37, p 20
 Macintire, H. J., Prof. of Refrigeration, U. of I.....Jun. 37, p 47
 Madison, R. D.....Feb. 37, p 58
 McGuire, J. F.....Aug. 37, p 60
 Nason, R. C.Jan. 37, p 106; Oct. 37, p 20

Authors (Cont'd)

- Neubecker, Wm. Jan. 37, p 57; Feb. 37, p 28;
 Mar. 37, p 62; Apr. 37, p 58; May 37, p 59; Jun. 37, p 60;
 Jul. 37, p 58; Sep. 37, p 80; Oct. 37, p 57; Dec. 37, p 52
 Oswald, L. S. Apr. 37, p 70
 Overton, Platte. Apr. 37, p 24
 Pehl, M. W. Jan. 37, p 128; Sep. 37, p 82; Dec. 37, p 54
 Pettingell, J. M. Apr. 37, p 65
 Prehn, Miss M. G. May 37, p 26
 Purcell, H. F. Apr. 37, p 64; Dec. 37, p 50
 Schueler, J. L. Apr. 37, p 30
 Schwartz, B. L. Mar. 37, p 66; Sep. 37, p 70
 Sherman, Ralph A. Mar. 37, p 64
 Snyder, Thos. E. Sept. 37, p 42; Oct. 37, p 22
 Swift, S. S. Nov. 37, p 59
 Towne, R. Louis.
 Jan. 37, p 103; Feb. 37, p 47; Apr. 37, p 68; Jun. 37, p 48
 Wagstaff, Alfred R. Sep. 37, p 67
 Welker, William H. May 37, p 67
 Wilson, J. Carl. Jan. 37, p 62; May 37, p 24
 Witzel, S. A. Oct. 37, p 60
 Wright, A. H. Dec. 37, p 16
 Young, E. O. Sep. 37, p 84

Codes and Ordinances, Licensing

- Codes and Licensing (E) May 37, p 19
 The Fort Wayne, Ind., Licensing Ordinance for Warm
 Air Heating (1) Jun. 37, p 23
 Our New Technical Code (E) Jul. 37, p 17
 The Fort Wayne Licensing Ordinance Jul. 37, p 91
 The Fort Wayne Licensing Ordinance Aug. 37, p 87
 The Fort Wayne Licensing Ordinance Sep. 37, p 33
 The Fort Wayne Licensing Ordinance Oct. 37, p 33
 Codes Need Education (E) Nov. 37, p 19
 The Fort Wayne Licensing Ordinance Nov. 37, p 91

Cooling

- The Cost of Summer Cooling, by M. K. Fahnestock.
 Jan. 37, p 120
 A Low Cost Cooling System, by M. W. Pehl.
 Jan. 37, p 128
 A Resume of Summer Cooling in the Research Resi-
 dence, by M. K. Fahnestock. Apr. 37, p 55
 A Resume of Summer Cooling in the Research Resi-
 dence, by M. K. Fahnestock (Part 2) May 27, p 62
 Calculation of the Refrigerating Load, by H. J. Mac-
 intire Jun. 37, p 47
 Summer Air Conditioning with Well Water.
 Jun. 37, p 50
 Well Water for Cooling—Coil Heated Air for Heating
 Jun. 37, p 54
 A Resume of Summer Cooling in the Research Resi-
 dence (Part 3), by M. K. Fahnestock. Jun. 37, p 57
 A Resume of Summer Cooling in the Research Resi-
 dence (Part 4), by M. K. Fahnestock. Jul. 37, p 51
 Well Water Cooling (Part 2) July 37, p 52
 Cooling a Funeral Parlor. Jul. 37, p 56
 Night Air Cooling, by S. Konzo. Jul. 37, p 60
 Cooling by Drying. Aug. 37, p 47
 Night Air Cooling, by S. Konzo. Aug. 37, p 48
 Well Water Cooling (Part 3) Aug. 37, p 50
 Cooling System for an Industrial Office. Aug. 37, p 54
 Cooling by Ventilation, by Paul R. Jordan. Aug. 37, p 58
 Shoe Store Cooling. Sep. 37, p 74
 Air Conditioning a Wild Game Canning Plant, by
 Frank E. Hawkins. Sep. 37, p 78
 Cooling by Evaporation, by M. W. Pehl. Sep. 37, p 82
 Apartments Cooled with Ice, by E. O. Young.
 Sep. 37, p 84
 Air Conditioning in New Zealand, by H. F. Purcell.
 Dec. 37, p 50

Cost, Estimating

- This "Price per Opening" Buzz Saw, by R. C. Nason
 Jan. 37, p 106
 A Nomograph Chart for Calculating Heating Costs, by
 J. Donald Kroeker. Jan. 37, p 124

Dehumidification

- Dehumidifying Coils Incrusted from Soap Dye in Air,
 by J. W. Baybutt. Mar. 37, p 28
 Cooling by Drying. Aug. 37, p 47
 Bin Drying of Seed Corn Dec. 37, p 16

Duct Construction

- Welded Ducts Reduce Shop Costs. Jul. 37, p 18
 Ducts of Welded Assembly, by M. W. Pehl.
 Dec. 37, p 54

Dust Collecting

- A Collector System for Buffing Exhaust, by R. F.
 Jeske Jul. 37, p 24

Engineering Design Data

- An Engineering Approach to True Comfort Heating,
 by Everett S. Buck. Jan. 37, p 99
 Design for a Forced Air Heating System with Indi-
 vidual Ducts, by S. Konzo. Jan. 37, p 108
 A Time Saving Method for Figuring Heat Loss, by
 E. A. Bailey. Jan. 37, p 113
 A Chart Method for Locating Splitters in Elbows, by
 R. D. Madison. Feb. 37, p 58
 Dehumidifying Coils Incrusted from Soap Dye in Air,
 by J. W. Baybutt. Mar. 37, p 28
 A Chart for Reading cfm Directly from Btu Loss.
 by L. S. Oswald. Apr. 37, p 70
 A Heating System Designed by the New Technical
 Code Jul. 37, p 54
 January's Floor Panel Heating (Schwartz & Buck)..
 Jul. 37, p 62
 Method for Calculating the Cooling Load. Aug. 37, p 56
 Charts for Round-Rectangular Pipe Areas and Sizes of
 Equal Friction, by Alfred R. Wagstaff. Sep. 37, p 67
 Testing Out for Trouble, by B. L. Schwartz.
 Sep. 37, p 70
 Checking Furnace Capacities, by S. Konzo. Sep. 37, p 75
 Checking Chimneys, by S. Konzo. Oct. 37, p 62
 A Time Saving Method for Figuring Heat Loss, by
 E. A. Bailey. Nov. 37, p 54
 Heat Loss of Rooms Below Grade. Dec. 37, p 56

Flashings

- Extraordinary Protection Against Leaks and Seepage.
 Jun. 37, p 20
 Better Weather Protection, Ridges. May 37, p 28

Forced Air Heating Facts, from the Research Residence

- Designing Duct Systems. Jan. 37, p 108
 Designing Duct Systems. Feb. 37, p 54
 Designing Duct Systems. Mar. 37, p 69
 Designing Duct Systems. Apr. 37, p 66
 Designing Duct Systems. May 37, p 57
 Night Air Cooling. Jun. 37, p 52
 Night Air Cooling. Jul. 37, p 60
 Night Air Cooling. Aug. 37, p 48
 Checking Furnace Capacities. Sep. 37, p 75
 Checking Chimneys. Oct. 37, p 62
 Draft Control. Nov. 37, p 62

Fuel

- Factors Affecting Fuel Saving, by S. Konzo.
 Mar. 37, p 60
 Factors Affecting Fuel Saving, by S. Konzo.
 Apr. 37, p 60

Fume Exhaust

- Fume Exhaust for Printing Presses, by R. F. Jeske..
 Apr. 37, p 20
 Exhaust System for Smoke, Heat and Gases in a Brass
 Foundry, by R. F. Jeske. May 37, p 22
 Exhaust System for Strip Tanks and Acid Crocks, by
 R. F. Jeske. Nov. 37, p 28

Fume Exhaust (Cont'd)

- Exhaust for Sulphuric Acid, by J. W. Baybutt.....
Aug. 37, p 19
 Plating Tank Exhaust, by R. F. Jeske.....
Sept. 37, p 40
 Exhaust System for Steam Baking Oven, by R. F.
 JeskeDec. 37, p 26

General Business

- Let's Look at the Record.....Jan. 37, p 45
 425,000 New Homes in 1937, by Wm. C. Bober.....
Jan. 37, p 53
 The 1937 "Home Market"—Our Greatest Potential
 Sales FieldJan. 37, p 60
 YOUR Tax Burden for 1937, by Jos. G. Dingle.....
Jan. 37, p 64
 Store Modernization Should Be an Active Field in 1937
Jan. 37, p 70
 Social Security, by Jos. G. Dingle.....Mar. 37, p 30
 New Duties for Employers, by Jos. G. Dingle.....
Feb. 37, p 24
 Why Associations?.....Mar. 37, p 19
 New York State Contractors Are Protesting This Leg-
 islationMar. 37, p 22
 Social Security, by Jos. G. Dingle.....Mar. 37, p 22
 It's Your Move (E).....Apr. 37, p 19
 An Analysis of State Unemployment Compensation
 LawsApr. 37, p 22
 Social Security, by Jos. G. Dingle.....Apr. 37, p 27
 It's Your Move (E).....May 37, p 19
 The Toledo Plan for Sheet Metal Working Appren-
 ticeshipMay 37, p 20
 Our Accounting Procedure for Unemployment Com-
 pensation, by Miss M. G. Prehn.....May 37, p 26
 Today's Revolution in Business, by J. G. Dingle.....
May 37, p 31
 What Am I to Do? (E).....Jun. 37, p 19
 The Labor Problem (E).....Jun. 37, p 19
 A Rapid Glance at the Labor Situation...Jun. 37, p 28
 The Cost of Doing Business (E).....Jul. 37, p 17
 Overhead—More Deadly Than Taxes, by Jos. G. Dingle
Jul. 37, p 22
 A Civil Service Examination for Sheet Metal Mechan-
 ics, by Frank E. Hawkins.....Jul. 37, p 28
 Unfinished Business (E).....Aug. 37, p 15
 What Is Bookkeeping? by Jos. G. Dingle.....Aug. 37, p 28
 Homes for the Masses (E).....Sep. 37, p 27
 Do You Have a Good Set of Books? by Jos. G. Dingle
Sep. 37, p 30
 A Job for Jobbers (E).....Oct. 37, p 19
 Winter Selling (E).....Oct. 37, p 19
 Arnold Kruckman's Washington Letter...Oct. 37, p 24
 Are Your Sales Properly Classified? by Joseph G.
 DingleOct. 37, p 30
 Arnold Kruckman's Washington Letter...Nov. 37, p 26
 Are Your Expenses Under Control? by Joseph G.
 DingleNov. 37, p 32
 A Plan of Accounts, by Joseph G. Dingle.....Dec. 37, p 32
 Did You Make a Profit in 1937 (E).....Dec. 37, p 15
 Fiberglass ActivitiesDec. 37, p 23
 Arnold Kruckman's Washington Letter...Dec. 37, p 24

Heating, Ventilating and Air Conditioning for Large Buildings

- The Warm Air-Fan System of Heating and Ventilat-
 ing for Churches, by Platte Overton...Apr. 37, p 24
 Ventilating a Garage.....May 37, p 33
 Air Conditioning a New Zealand Furnace Works, by
 H. F. Purcell.....Apr. 37, p 64
 Air Conditioning a Wild Game Canning Plant, by
 Frank E. Hawkins.....Sep. 37, p 78
 The Armco Research Laboratory.....Dec. 37, p 28
 Air Conditioning in New Zealand, by H. F. Purcell...
Dec. 37, p 50

Humidification

- Humidity in House Heating (Part 3).....Feb. 37, p 60
 Humidity in House Heating (Part 4)....Mar. 37, p 74
 Some Fallacies of 40 Percent Relative Humidity.....
Nov. 37, p 60; Dec. 37, p 48

Kinks

- Depth and Marking Gauge.....Aug. 37, p 25
 Chain Lever Block.....Dec. 37, p 55

Metal Fabrication

- Fabricating Procedure for Pipe of Stainless Clad Steel..
Feb. 37, p 31
 Heavy Stuff.....Aug. 37, p 16

Oil Burning

- Recommended Revision of Fuel Oil Specifications...
Feb. 37, p 62
 Performance of Oil-Fired, Warm Air Furnaces in the
 Research Residence, by A. P. Kratz & S. Konzo....
Oct. 37, p 53
 Performance of Oil-Fired, Warm Air Furnaces in the
 Research Residence, by A. P. Kratz & S. Konzo....
Nov. 37, p 51
 Oil Burners—A Case History of One Firm's 15 Years'
 Experience, by S. S. Swift.....Nov. 37, p 59
 Performance of Oil Fired, Warm Air Furnaces in
 Research Residence, by A. P. Kratz and S. Konzo..
Dec. 37, p 45

Patterns

- Pattern Development for Forced Air Fittings, by Wm.
 NeubeckerJan. 37, p 57
 Pattern for a Range Canopy, by W. R. Haines.....
Feb. 37, p 30
 Pattern Development for Air Conditioning Fittings, by
 Wm. Neubecker.....Mar. 37, p 62
 Pattern Development for Air Conditioning Fittings, by
 Wm. NeubeckerApril 37, p 58
 Pattern Development for Air Conditioning Fittings, by
 Wm. Neubecker.....May 37, p 59
 Pattern Development for Air Conditioning Fittings, by
 Wm. NeubeckerJun. 37, p 60
 Pattern Development for Air Conditioning Fittings, by
 William NeubeckerJul. 37, p 58
 Scalene Cone Intersected by a Cylinder Obliquely, by
 L. F. Hyatt.....Aug. 37, p 23
 A Peculiar Offset Elbow, by David C. Jones.....
Sep. 37, p 32
 Pattern Development for Air Conditioning Fittings, by
 William Neubecker.....Sep. 37, p 80
 Pattern Development for Air Conditioning Fittings, by
 William Neubecker.....Oct. 37, p 57
 A Dust Flue Pattern, by L. F. Hyatt....Nov. 37, p 30
 Patterns for Reducers and Offsets, by Wm. Neubecker
Dec. 37, p 52

Painting

- Treatment of Galvanized Sheets for Painting, by J. L.
 SchuelerApr. 37, p 30

Problems

- Removing Galvanizing.....Mar. 37, p 26
 Temperature Overrun in Mild Weather...Mar. 37, p 26
 A Drying Agent.....Mar. 37, p 26
 Attic Frost.....Mar. 37, p 26
 Store Window Frosts Over.....Mar. 37, p 27
 Brick Wall Leaks.....Mar. 37, p 27
 Heat BoosterMar. 37, p 27
 Mechanical Code Mathematics.....May 37, p 30
 Return Air Resistances.....May 37, p 30
 Temperature Overrun.....Jul. 37, p 93
 Window Condensation.....Jul. 37, p 93
 Neubecker Pattern Error.....Jul. 37, p 93
 Cyclone Dimensions.....Jul. 37, p 94
 Glass and Wall Loss Factors.....Jul. 37, p 94
 Attic Frost.....Aug. 37, p 22

Problems (Cont'd)

Office Cooling	Aug. 37, p 22
Heat Loss Coefficients.....	Aug. 37, p 22
What Is Air Conditioning?.....	Sept. 37, p 38
Chimney Draft	Sep. 37, p 38
Atmostat	Sep. 37, p 39
Creosote in a Chimney.....	Sep. 37, p 39
Removing Galvanizing	Sep. 37, p 39
Temperature Overrun in Mild Weather....	Sep. 37, p 39
Metal Deteriorates	Nov. 37, p 23
Air Circulation and Combustion.....	Nov. 37, p 23
Register Dirt	Nov. 37, p 24
Balancing Heating System.....	Nov. 37, p 24
To Prevent Sweating on Cold Surfaces....	Nov. 37, p 88
Register Dirt	Dec. 37, p 31
Oily Filament at Registers.....	Dec. 37, p 31

Roofing

3,500 Sq. Ft. of Dead Level Roof.....	Jan. 37, p 72
The Metropolitan Museum's (N. Y.) New Metal Roof.	Feb. 37, p 20
A Roof Sold on Quality—Not Guarantee.....	Jul. 37, p 21
Black Plague, by Lawrence E. Gichner....	Sep. 37, p 46
Metal Shingles	Oct. 37, p 26

Schools

Study Courses in Heating, Ventilating and Air Condi- tioning	Jan. 37, p 130
Michigan State Short Course in Air Conditioning....	Feb. 37, p 78
Polytechnic Institute of Brooklyn, N. Y....	Nov. 37, p 114

Skylights

Skylight Construction, by Wm. Neubecker.....	Feb. 37, p 28
--	---------------

Specialty Manufacturing

Temple Specializes in Industrial Sheet Metal Work..	Jun. 37, p 30
Sheet Iron Brazier.....	Aug. 37, p 30
Contractor Manufacturers Coolers, by Joseph C. Coyle	Sep. 37, p 28
50,000 Cabinets in 1936, by R. C. Nason....	Oct. 37, p 20
Scale Pans (The Lumm Co., Toledo).....	Nov. 37, p 20

Stokers

The Combustion of Bituminous Coal in a Small Under- feed Stoker, by Ralph A. Sherman and E. R. Kaiser.	Mar. 37, p 64
Step-by-Step to Conversion.....	Dec. 37, p 47

Technical Code (Mechanical)

Technical Code for the Design and Installation of Mechanical Warm Air Heating Systems.....	Mar. 37, p 57
Technical Code for the Design and Installation of Mechanical Warm Air Heating Systems.....	Apr. 37, p 61
Technical Code for the Design and Installation of Mechanical Warm Air Heating Systems.....	May 37, p 66
A Heating System Designed by the New Technical Code	Jul. 37, p 54
The New Technical Code.....	Aug. 37, p 52
The New Technical Code.....	Sep. 37, p 72
The New Technical Code.....	Oct. 37, p 64
The New Technical Code.....	Nov. 37, p 56

Ventilation

Ventilating for Heat Removal in a Steel Wire Mill, by George H. Laws.....	Mar. 37, p 20
Place Air Intake to Avoid Pulling in Dust, by J. M. Pettingell	Apr. 37, p 65
Ventilating a Garage to Wisconsin Specifications.....	May 37, p 33
Bowling Alley Ventilation, by R. F. Jeske.....	Oct. 37, p 28

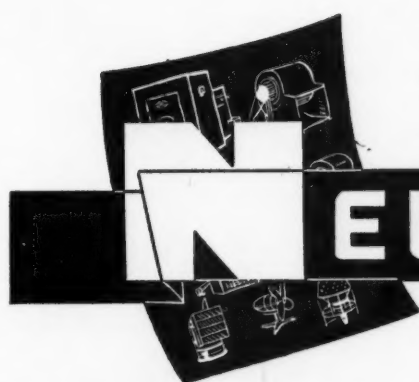
Welding Practice

Arc Welding Stainless Steel, by J. Carl Wilson.....	Jan. 37, p 62
Theory and Application of Resistance Welding (Part 1), by L. H. Frost.....	Mar. 37, p 24
Theory and Application of Resistance Welding (Part 2), by L. H. Frost.....	Apr. 37, p 28
Welding Procedure for the Sheet Metal Shop, by J. Carl Wilson.....	May 37, p 24
Theory and Application of Resistance Welding (Part 3), by L. H. Frost.....	Jun. 37, p 25
Welded Ducts Reduce Shop Costs.....	Jul. 37, p 18
Finishing Welds in Stainless Steel.....	Jul. 37, p 26
A Welded Church.....	Aug. 37, p 18
Finishing Welds in Stainless Steel.....	Aug. 37, p 20
Resistance Welding (Part 4), by L. H. Frost.....	Sep. 37, p 44
Ducts of Welded Assembly, by M. W. Pehl.....	Dec. 37, p 54

For your convenience a number has been assigned each item. Check the items in which you are interested on the coupon on page 98 and mail to us. Complete information will be forwarded.

● Indicates product not listed in 1937 Directory.

△ Indicates product and manufacturer not listed in 1937 Directory



NEW PRODUCTS

192—Snaptite Beaded Gutter

The Berger Manufacturing Division on Republic Steel Corporation, Canton, Ohio, offers a new beaded gutter in which the joints slip together and the bead edges snap into place.

The new gutter is designed to save erection time and eliminate close trim-

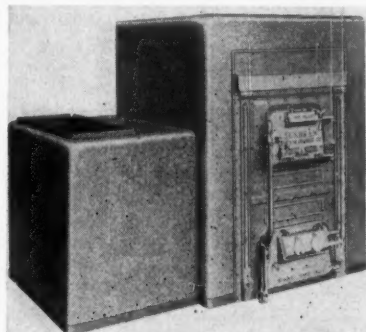


ming to length because its joints conveniently slip inside one another. It can be soldered without tacking and requires no slip joints. Complete forming in one operation with a specially developed rotary fabricating machine assures positive rigidity and uniformity, according to Berger Engineers.

The Snaptite gutter, latest addition to the Berloy Blue Label Line of steel building products, is produced in rust-resisting Toncan Iron, Berloy galvanized copper alloy, open hearth steel and 40-pound Terne.

193—New Sunbeam Cabinets

The Fox Furnace Company of Elvira, Ohio, has announced the modernization and improvement of cabinets furnished with the Sunbeam coal and oil fired series Nos. 20, 80, 5500; oil



fired series 720-R and gas fired series "M" air conditioning unit.

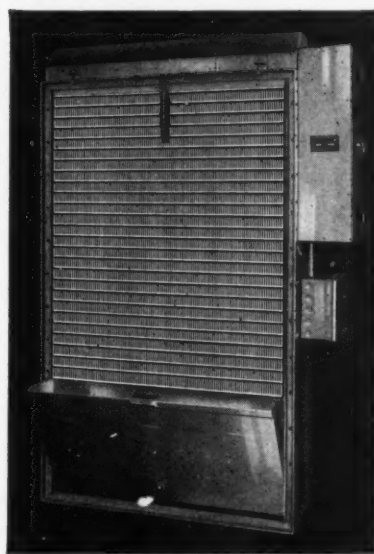
The design of the cabinets is said to include an improvement in appearance and in the mechanical operation of the units. Corners have been rounded and exterior sheet metal screws eliminated. The finish is fine grained, green, crystalline baked enamel.

194—Ralpo Junior Cutter

Ralph W. Poe, Canton, Illinois, announces the addition to his line of Ralpo cutting tools of the Ralpo Junior which cuts 22-gauge and lighter and which he claims is the ideal tool for light sheet metal work, furnaces, spouting, duct work, etc.

195—Multi-Panel Filter

American Air Filter Company, Inc., 220 Central Ave., Louisville, Ky., has developed a new type of panel construction for the multi-panel filter, claimed to provide three stages of air cleaning in a curtain type filter, to be non-clogging with lint and heavy granular dust concentrations, to have the same high cleaning efficiency of the



former all-screen panel, and to be more positive in its self-cleaning action.

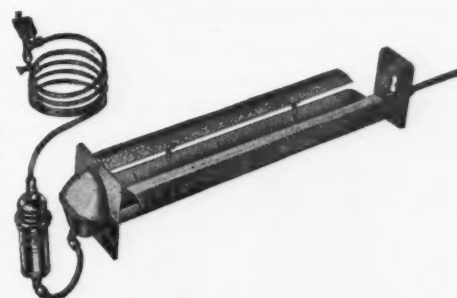
This new "armored" panel is a combination of woven screen and a die-stamped louvre section.

The added weight of the "armored" section improves the self-cleaning action by accelerating the movement of the panel thru the oil bath. This actively forces the oil thru screen section of the panel to obtain more positive removal of the dust accumulation.

The "armored" panel is now standard equipment on all Multi-Panel filters. It is also interchangeable with former types of all-screen panels and any Multi-Panel now in service may be equipped with armored panels.

196—New Humidifier

Maid-O'-Mist, Inc., 180 N. Wacker Drive, Chicago, has added a humidifier with the new 26-inch length pan designed for use with either gravity or forced circulation heating systems. The unit may be adapted to any city water pressure by raising or lowering



the new type Water-Boy safety feeder through which water is fed to the humidifier pan. After the water level is adjusted, it is maintained automatically by the Water-Boy. The patented self-locking, adjustable, overflow plate permits raising one end of the pan at will to reduce its evaporating area and thus prevent over-saturation during extremely cold weather. Patented wings, which are hinged to the 26-inch bronze pan, plane warm air over the water.

197—Power Squaring Shears

Niagara Machine & Tool Works, 637 Northland Ave., Buffalo, N. Y., announces the addition of a line of new series SL power squaring shears built



in 6, 8, 10 and 12 foot lengths for flat shearing of 3-16 in. steel and 14 and 16 foot lengths for 10-gauge steel. Triangular section crosshead with low slope, enclosed drive mounted on anti-friction bearings running in oil, 14 point engagement sleeve clutch with built-in single stroke mechanism and Niagara alloy steel knives are included.

New Products

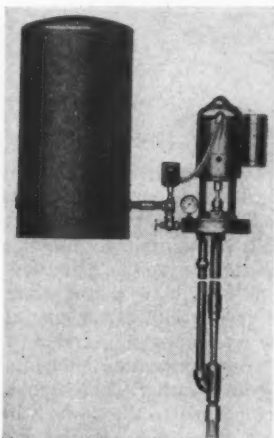
For your convenience in obtaining information regarding these items, use the coupon on page 98

▲ 198—Rawhide Mallets

Chicago Rawhide Mfg. Co., 1312 Elston Ave., Chicago, Ill., announces a line of tough, resilient mechanical rawhide mallets for sheet metal work. It is claimed that the solid rawhide head will not split, dent or crumble away.

199—Deep or Shallow Wells

Fairbanks, Morse & Co., 900 S. Wabash, Chicago, announces a new vertical, close-coupled motor-driven centrifugal pump for general service in deep or shallow wells. This new pump was designed to meet the recognized need for a small-diameter, low-capacity, dependable pump with low initial and operating costs. It is ideal for economically pumping water under either high or low pressure at 6 to 60 gallons per minute.



Units for shallow well service consist of combined motor, pump and base, into the bottom of which is screwed a single suction pipe extending below the water level. This is satisfactory for water lifts of 15 to 20 ft.

Pumps for deep well—20 to 200 ft. deep—are equipped with an ejector and venturi in one of two drop pipes extending from the pump down into the well. This deep-well pump operates on the accepted principle of the centrifugal pump, with the ejector added to lift water from depths beyond that from which a centrifugal pump alone will lift it. By allowing a predetermined amount of water from the pump discharge to bypass down one of the drop pipes in the well and back up through the ejector into the venturi, a vacuum is created above the ejector nozzle, drawing well water into the suction chamber. The high velocity of the water through the venturi, and the mixing of the two streams of water, lifts the well water to within reach of the pump suction. Positive water lift is insured.

200—New Oil Burner Controls

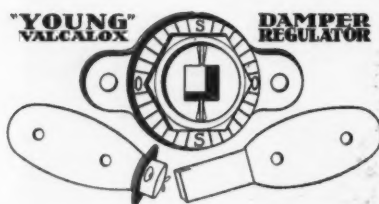
Penn Electric Switch Co., Goshen, Indiana, announces to the oil heating industry two new stack safety combustion controls for A. C. service on all types of burners.



These two new stack switches are known as the Type 670 (continuous ignition) and Type 672 (intermittent ignition). These controls incorporate the proved circuits formerly available in the Penn stack switch line. In addition, they offer voltage protection, a feature which gives positive automatic shutdown of the burner to guard against ignition failure in the event of sub-normal voltages in the supply line, according to the company's announcement.

● 201—Damper Regulator

The Young Regulator Company, 4500 Euclid Avenue, Cleveland, Ohio, announces the new Valcalox Damper

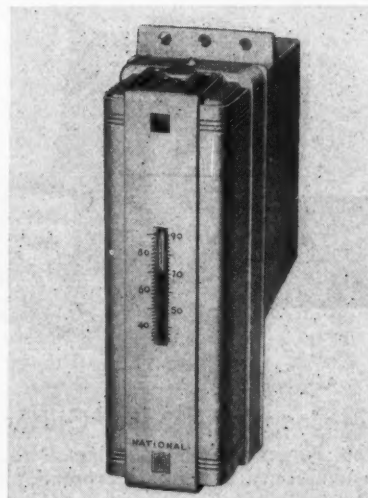


Regulator. This new regulator indicates position of damper, locks securely, can be placed on partition wall or in any location of duct, rotates 360 degrees, has zinc alloy base, and comes complete with bearings, rivets and screws.

▲ 202—Saf-ty Mallets

Martin Bersted Company, 20 E. Jackson Blvd., Chicago, announces a new development in mallet construction—a molded composition—in different weights without loading or increasing the size of the mallet.

These mallets also vary in hardness and are claimed to be perfect insulators for electricity. They may also be altered in shape for special needs.



203—Submaster Thermostat

The National Regulator Division of the Minneapolis-Honeywell Regulator Company, Minneapolis, recently introduced a newly designed Pneumatic Submaster room thermostat which regulates temperatures in a room with relationship to conditions at another point. For example, by installing a Submaster Thermostat under the regulation of a master controller placed at an outside location, the inside temperature of a room will be raised from 72 to 82 deg. F. as the outdoor temperature rises from 70 to 100 deg. F.

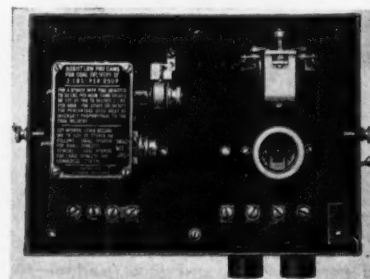
A switch arrangement is also provided so that the Submaster feature can be disconnected, and the thermostat operated as a conventional room thermostat.

This thermostat is designed for use with all types of heating and cooling equipment where graduated control by compressed air is desired.

The scale range has been changed from 54-98 deg. to 46-90 deg. F. with scale markings every 4 deg. The standard finish is silver.

204—Sapphire Jewelled Control

Russell Electric Company, 340 W. Huron St., Chicago, Illinois, announces the new Hold-Heet DeLuxe stoker timer.



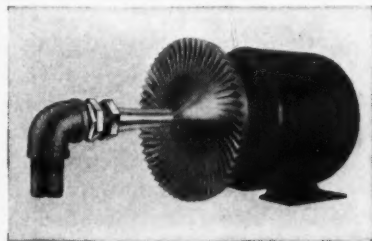
Features include sapphire jewel bearings with hardened, burnished pivots, slow speed induction disc motive power, and dust tight sealing of the complete mechanism in a die cast housing.

New Products

For your convenience in obtaining information regarding these items, use the coupon on page 98

▲ 205—Spray Wheel

D. J. Murray Mfg. Co., Wausau, Wisconsin, announces "Murray-Preston" an improvement in rotary spray wheels. The spray or fog-generating medium is an integral part of the en-

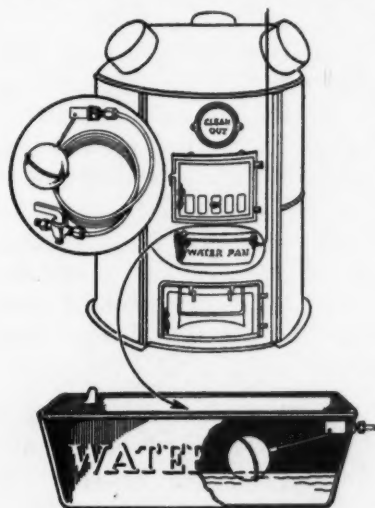


tire unit. Delivery is through the nozzle. It is self-cleaning and furnishes a steady and uniform spray. It is readily adaptable to air washers or other equipment having banks of spray nozzles.

Being a one-piece construction and so designed that it can be made of metals resistant to extreme air and temperature, this spray wheel is suitable for high temperature cleansing or recovery. The motor in the case of the direct connected units is the splash-proof, totally enclosed type.

▲ 206—Water Pan Control

The G. & S. Tool Company, 8790 Grinnell, Detroit, Michigan, is now in production on a new type automatic



valve for the water pan in hot air furnaces. This valve is made of brass with stainless steel valve and comes with connections and 7 feet of copper tubing.

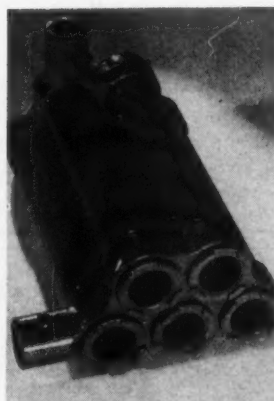
● 207—Fan-Filter Unit

The Peerless Electric Company, Warren, Ohio, is introducing a new cabinet fan to meet the demand for a low-price fan filter.

This new unit is powered with a two speed motor and delivers 1200 cfm on high and 850 cfm at low speed. The motor is of the capacitor type, and is fully enclosed with spring and rubber mountings for quiet operation. The two filters are 20" x 20".

● 208 Stack Water Pre-Heater

Reif-Rexoil, Inc., Buffalo, New York, announces a new product known as the Leidig free stack water pre-heater, the essential purpose of which is to provide domestic hot water from waste stack heat. The free stack pre-heater (patents applied for) consists of five outer tubes and five concentric inner tubes with a space of one-eighth inch between the inner and outer tubes



through which a thin film of water rapidly circulates.

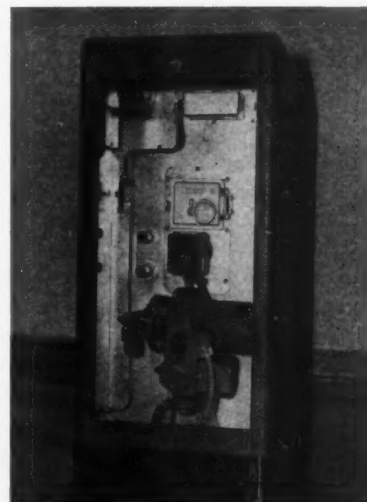
Scientific design of the headers cause the water to travel back and forth the entire combined length of fifty inches before it reaches the outlet port. Hot stack gases pass inside and outside of the tubes and heat is rapidly absorbed.

Under continuous operation the Free Stack Water Pre-Heater is said to heat thirty gallons of water to a ninety degree temperature rise in three hours with a four hundred fifty degree stack temperature. It recovers and uses about 25 per cent of the heat loss.

209—Blower Wheels

The American Blower Corporation of Detroit Michigan, has granted a license to The Torrington Manufacturing Company of Torrington, Connecticut, to manufacture and sell pressed steel blower wheels under American Blower patent numbers 1,513,763 and 1,648,060.

These wheels will be priced lower than The Torrington Aluminum blower wheels, supplying a need for certain applications.



210—New A. C. Line

Chrysler Corporation through its air conditioning subsidiary, Airtemp, Incorporated, Dayton, Ohio, announces a line of improved heating and air conditioning equipment for homes of all sizes.

"For 1938 Airtemp has a complete new line of winter air conditioning equipment, boilers and oil burners," states Col. A. C. Downey, Airtemp president. "Winter air conditioners and boilers are provided in both oil and gas burning models.

"A feature of the 1938 Airtemp line is the new oil-burning winter air conditioner of 100,000 Btu capacity, known as model OF-100. Gas burning models are also available.

"The OF-100 provides filtering, humidification and circulation of the air."

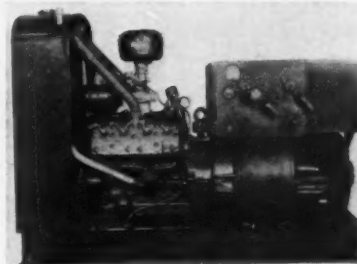
President Downey added that all sheet metal surfaces of the Airtemp winter air conditioners are "Bonderized"—and thus protected by the same patented process used to prevent rust of automobile finishes.

For 1938 Airtemp has also provided advances in the oil burner line.

For steam, vapor and hot water heating systems Airtemp's 1938 heating line includes a complete line of oil and gas burning boilers.

211—Engine Driven Welder

General Electric Company, 1 River Road, Schenectady, New York, has developed a new, single-operator, portable welder, combining the improved



Type WD132B G-E arc-welding generator and a standard 60 hp Ford V-8 engine so that successful arc-welding can be done independently of electric-power line service.

Dingle's Plan of Accounts

(Continued from page 34)

Accrued Taxes, Real Estate and Personal

In order that the expenses of the business may be more accurately stated each month, such items of expense as Real Estate and Personal Taxes, which are paid once a year, should be pro-rated over the year, and by the use of this account (No. 62) the estimated monthly cost of these taxes may be built up month by month in anticipation of the date of payment. When paying taxes, the charge should be against this Accrued account rather than the expense account.

Accrued Taxes—Old Age Benefits

As wages and salaries are paid, it is required that the employer withhold from the employee 1% of total wages, and during the month following such payment to the employee, the employer is required to pay over to the Collector of Internal Revenue, not only the 1% withheld from the employees, but another 1% levied against the employer. This percentage will increase from time to time until it reaches the present statutory maximum of 3% payable by the employee and 3% payable by the employer. As the tax is withheld from the employees, it will be credited to this account (No. 63) AC-

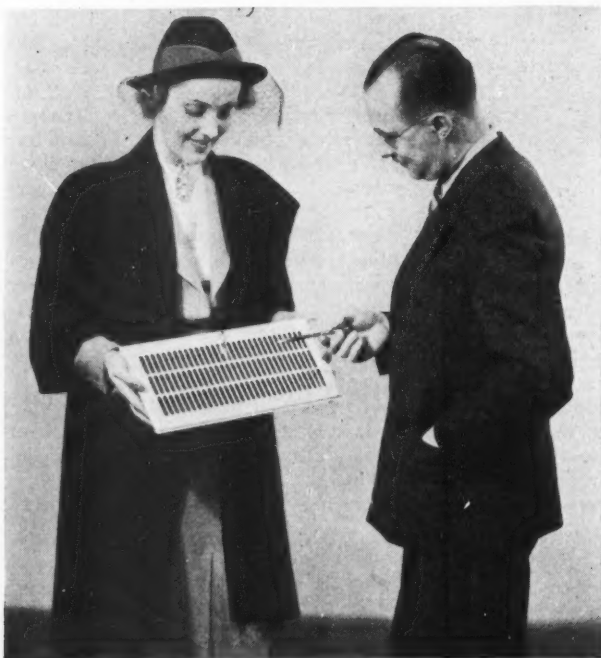
CRUED TAXES—OLD AGE BENEFITS, and in closing the books for the month, the bookkeeper should compute the employer's percentage of OLD AGE BENEFITS TAXES on the month's pay roll, charge Taxes-Old Age Benefits, and credit this accrued account, thus, in the closing of the books for the month, this account will carry the amount which is, during the next month, payable to the Collector of Internal Revenue.

Accrued Taxes—Unemployment Compensation—Federal

The present statute provides that employers of eight or more for twenty or more days during a given year, each day being in a different week, shall pay a tax on the total wages of the employees. To those who are consistently employing eight or more, this tax is a definite obligation and the percentage of the month's pay roll should be computed and taken into the accounts, with a charge to the expense account TAXES — UNEMPLOYMENT COMPENSATION, (No. 64) and a credit to this accrued account. This Federal tax is payable in January of each year for the prior year's pay roll.

Accrued Taxes—Unemployment Compensation—State

This tax is related to the Federal Unemployment Compensation Tax, and is a percentage of the pay roll. Some states require monthly payments, others annual payments. The operation of this account (No. 65) is quite similar to the Federal account next



Complete Register Satisfaction in a Single Line

Auer Stamped Steel Registers have a long and unbroken record of popularity with the heating industry. Auer offers a wide choice of register styles for Gravity Heating Systems, combining neat, attractive design, unusual structural strength and maximum heating efficiency. Valve operation is smooth and positive. With Auer special features for ease of installation, a tight, streak-proof job is assured. We supply all standard and special finishes. Designs to harmonize with *any* interior decorative scheme.

Complete Catalog 37, showing all Auer models—Register, Intakes, and Grilles—for both warm air heating and air conditioning, will be sent on request.

THE AUER REGISTER COMPANY, 3608 PAYNE AVENUE, CLEVELAND, OHIO

AUER DISTINCTIVE **REGISTERS**
& GRILLES  **For Air Conditioning and Gravity**

above, and the discussion there is believed to cover the requirements here.

Accrued Interest

Monthly, the interest earned on outstanding notes payable should be computed and taken into the expense account, Interest, with the off-setting credit to Account Interest (No. 66). When interest is paid, the charge should be against this accrued account, rather than the expense account Interest.

Accrued Liability Insurance

Workmen's Compensation insurance premiums are based upon pay rolls, and in closing the books at the end of the month, the rates should be applied against the wages for the month, with charge to the expense account INSURANCE - WORKMEN'S COMPENSATION, and corresponding credit to this account. When premiums are paid, the charge is to be made against this Accrued account (No. 67).

Reserve for Depreciation—Mchy. & Eqpt. (No. 68)

Reserve for Depreciation—Delivery Eqpt. (No. 69)

Reserve for Depreciation—Furniture & Fixtures (No. 70)

These accounts are to receive monthly credits for the proper monthly charge to depreciation for the several classes of equipment used.

Capital Accounts

If the business be individually owned, there would be one capital account, showing the name of the proprietor, thus: John Smith—Capital. If the

business be operated as a partnership, there should be capital accounts for each partner, showing the name of the partner and the word "Capital" after the name. If the business is operated as a corporation, there would be a Capital Stock Account, also a Surplus Account.

Sales—Material (No. 101)

Sales—Labor (No. 102)

Sales—Appliances (No. 103)

Sales—Appliances Wholesale (No. 104)

These four sales accounts are to contain the sales according to the several names shown. In a recent article (October, 1937), we discussed at some length the problem of properly classifying the sales, and we would refer you to that article for some more detailed information on this series of accounts.

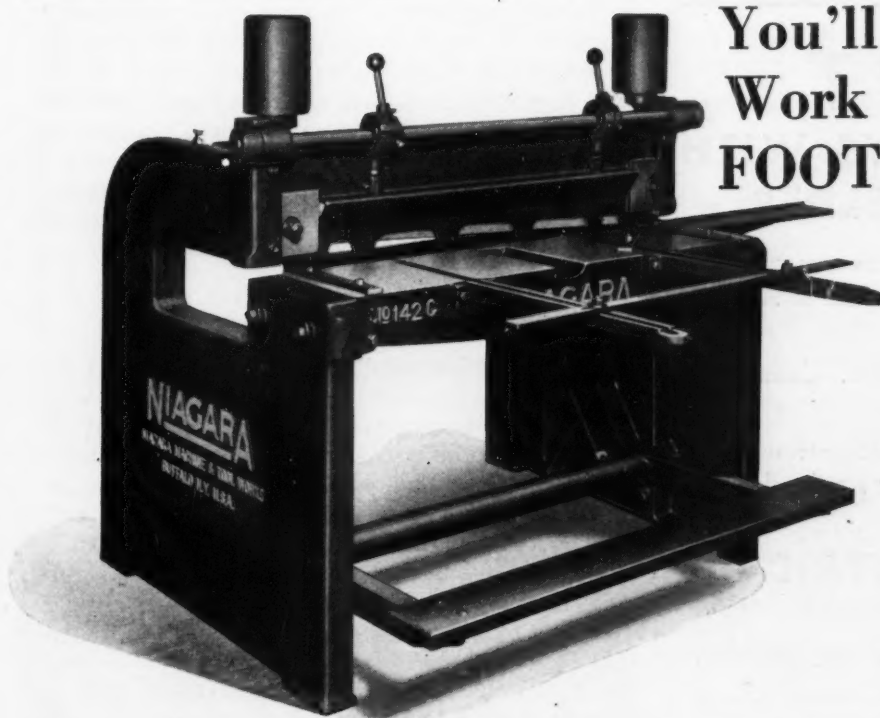
Cost of Sales—Material (No. 111)

Cost of Sales—Labor (No. 112)

Cost of Sales—Appliances (No. 113)

Cost of Sales—Appliances Wholesale (No. 114)

These accounts were also discussed in the prior article, as mentioned under the Sales accounts next above, and we would refer you to that article for further information. We would here call attention to the fact that at the close of each month, the sales should be costed, and the proper entry made to transfer from the inventory accounts, also the la-



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2. 16 Gage Capacity—36" to 72" cutting lengths
3. 18" Gap
4. Modern Closed Panel Housings
5. Self Locking Steel Hold-Down
6. Visible Cutting Line
7. Steel Cross Head
8. Tubular Treadle Mechanism
9. Niagara Alloy Steel Knives
10. Complete with front, side, bevel, slitting and back gages

A Complete Line of Machines for Your Sheet Metal Shop

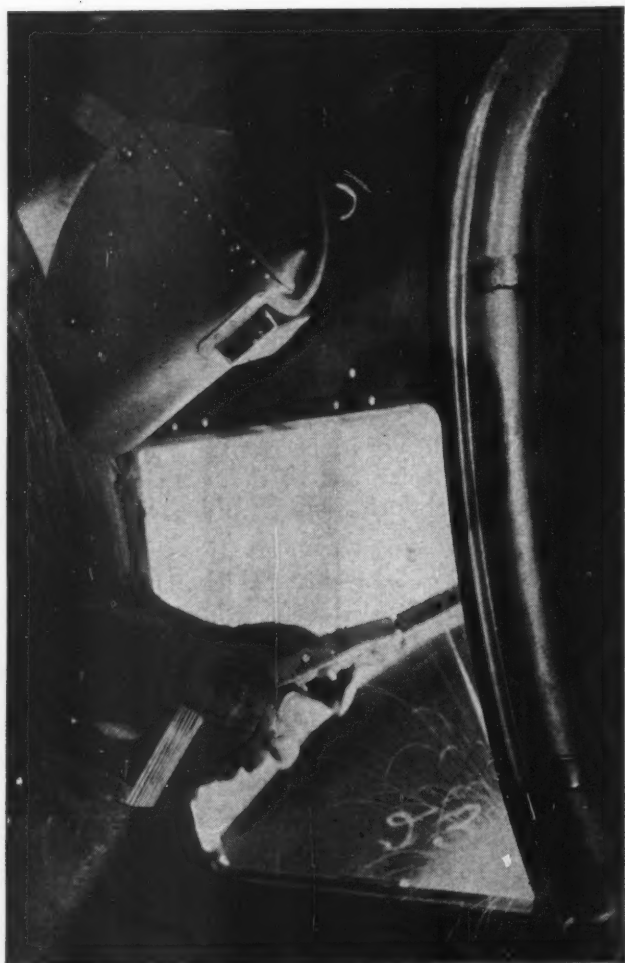
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Groovers—Seamers
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Shears, Squaring, Rotary
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Machines for Turning, Winding, Beading, Burring, Flanging

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683 Northland Avenue Buffalo, N. Y.



PROFIT THESE THREE WAYS WITH A LINCOLN WELDER

- 1—You can expand your business into new, profitable lines of fabrication work including stainless steel and aluminum products.
- 2—You can cut your fabricating costs. Users report savings of 25% to 50%.
- 3—You can buy this powerful motor-generator type arc welder at the lowest price ever set for this class of equipment.

THE LINCOLN ELECTRIC CO.

Largest Manufacturers of Arc Welding Equipment in the World

MAIL THE COUPON FOR DETAILS

THE LINCOLN ELECTRIC CO.
Dept. EE-451, Cleveland, Ohio

Send a free copy of Bulletin 314 and easy payment details on the Lincoln Sheet Metal Shop Welder.

Name Position

Company

Address

City State

bor accounts, the cost of the sales for the month. See discussion under the Inventory accounts, for reconciliation of the inventory accounts at the close of the year after taking physical inventories.

Returns & Allowances—Material (No. 121)

Returns & Allowances—Labor (No. 122)

Returns & Allowances—Appliances (No. 123)

Returns & Allowances—Appliances Wholesale (No. 124)

These accounts, as their names indicate, are to contain the returns and allowances made for the different sales departments. For instance, assume the return of an appliance; the entry would be to credit accounts receivable with the billed price of the appliance, and debit Returns and Allowances—Appliances. When merchandise is returned, the proper cost of sales accounts should receive credit, and inventory account receive charge covering cost of merchandise returned to inventory. Assume, also the allowance of a credit of \$10.00, for the labor content of a sale of an installed job; the entry would be to credit the account receivable and charge Returns and Allowances—Labor.

Discount Taken (No. 131)

Interest Earned (No. 132)

Commissions Earned (No. 133)

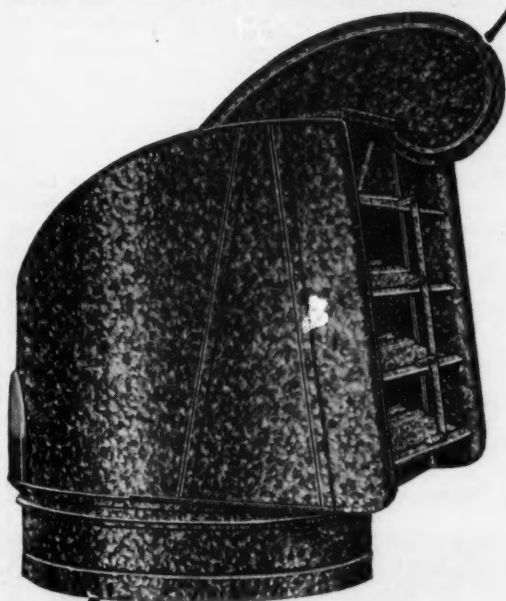
As their names indicate, these are income accounts to contain discount taken, interest earned, and commissions earned. While we have provided an account "ACCRUED INTEREST" to contain the liability for interest which accrues from month to month on notes payable, we have not provided an account to contain the interest earned on the notes receivable, believing that the usual procedure will be such that interest will be paid monthly on most of the notes receivable, and when received it will be taken into this income account. Commissions earned will likewise be taken into account when received, rather than when earned, for the same reason.

Expenses.

We will not discuss these accounts separately, for the reason that the account names will indicate what expenses are to be charged into the several accounts, and in the discussion of the accounts above, we have already pointed out the more or less unusual items, and the method of handling. We will, however, warn against poor expense classification, and where a business has expenses of a nature which are not here provided for, the bookkeeper should raise a suitably named account to contain that expense. We would also urge the business man to watch his expenses, and be on the alert to stop excessive or runaway expenses promptly. No matter how large the sales volume may be, the expense cost must be kept in strict control if there is to be a profit at the close of the month or year.

Next month, we shall present illustrations of the proper journals for use with this chart of accounts, and, as we have frequently stated, we are only too glad to answer questions pertaining to your book-keeping problems.

It's a "Honey"



Improved construction—

Greater capacity—

Modern lines—

Better looking—

But *NO* increase in price—that, in few words, is the *NEW Swartwout Rotary*.

Rigid steel tubing welded frame—stainless steel fully enclosed ball bearings — and other features that help you to sell and which keep it "Sold" — and a trade discount to sheet metal contractors.

Write for folder and name of your district representative.

THE SWARTWOUT COMPANY

18615 Euclid Avenue
Cleveland, Ohio

The *NEW* Swartwout ROTARY BALL BEARING VENTILATOR

REPEAT BUSINESS PROCLAIMS No. 43-A A SALES SUCCESS



Remarkable features of new Asbestos Paper endorsed by users

EVERYWHERE it's the same story. "You should have brought out No. 43-A Asbestos Paper *long ago*. It fills a long-felt need. Never before have we been able to get in one product the remarkable strength found in No. 43-A and at the same time know that it contains no inflammable adulterants usually used as strengthening agents in commercial asbestos papers.

"You have a remarkably fine blue-white color. The smooth surface does not retain dirt readily and wherever dirt does collect, it can be wiped off; this paper actually repels moisture."

What these contractors have found, you, too, will discover if you will but test No. 43-A. For this unique product has everything—*strength, color and finish*—to make it the ideal Asbestos Paper.

See these qualities for yourself. Send for the 5-foot free sample of No. 43-A. We will gladly mail you this sample for test, if you will mail the coupon below.

RU-BER-OID  WATSON
Asbestos Papers
FREE THIS CANISTER CONTAINING
5 foot Sample

The RUBEROID Co., Insulation Department
500 Fifth Avenue, New York City

Send us your free 5-foot test sample of No. 43-A Asbestos Paper. We understand this places us under no obligation.

AA 12-37

Name

Address

City State

Since Ruberoid sells through wholesale trade only, please give jobber's name.



STEEL...

WITHIN ARM'S REACH OF YOUR TELEPHONE

PHONE

REPUBLIC 9100

when you need steel in a hurry. No matter the quantity . . . whether a car or a bar . . . immediate shipment is assured. Send for our new stock reference book.



BARS • SHAPES • ANGLES

PLATES • SHEETS

TINPLATE

BENJAMIN WOLFF AND COMPANY

58TH ST. AND SEELEY AVE.

CHICAGO

REPUBLIC 9100

With The Manufacturers . . .

Apex Purchases Zephyr

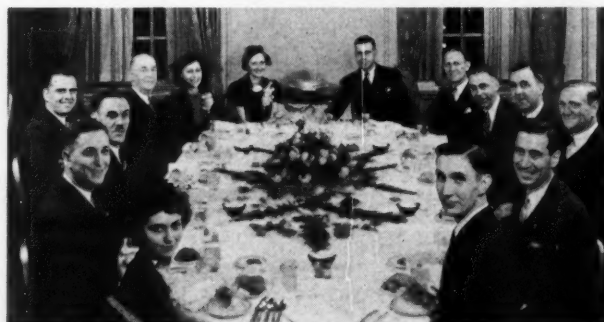
The Apex Electrical Manufacturing Company, Cleveland, has bought the Zephyr Air Conditioning Division of the Savage Arms Corporation, Utica, N. Y., and is transferring the machinery to its Bessemer Avenue plants in Cleveland.

Savage has been manufacturing air conditioning equipment since 1926. More than 10,000 of its Zephyr units are declared to be in use.

"Purchase of the Zephyr business, which includes basic patents on various features, follows several years' study of air conditioning, during which we have done considerable experimental work," said C. G. Frantz, president. The equipment to be manufactured by Apex will include facilities for cleansing, humidifying and circulating the air in the winter; and cooling, cleansing, dehumidifying and circulating it in the summer.

Celebrates Fifth Anniversary

Ward Machinery Company, Chicago, celebrated its fifth anniversary on November 5, with a dinner for its employees at the Lake Shore Athletic Club. This concern is proud of



their record. They have sold in 46 of the 48 states and 7 foreign countries.

Ward Machinery offices were filled with flowers and floral pieces sent by their many friends on their fifth anniversary.

Factoring

Richardson and Boynton Company, 244 Madison Avenue, New York City, has employed William Iselin & Co., factors, to handle their credits and collections.

Factoring, at its inception, embraced both the merchandising and financing functions. Now the factor buys accounts receivable outright, advancing cash upon receipt of invoice covering shipment and without recourse except where merchandise fails to meet specifications. The key credit personnel of Richardson and Boynton has been absorbed, thus assuring continuity of service to customers and giving the Iselin organization the specialized knowledge of the trade essential to quick credit clearing.

Minneapolis-Honeywell in Chicago

The Minneapolis-Honeywell Regulator Company, Minneapolis, recently expanded its facilities in Chicago, taking over the entire 7th floor of the Furniture Exhibition Building at 433 E. Erie Street. This change will allow Minneapolis-Honeywell 10,500 square feet of office space for the Chicago area operation.

A prominent feature is a large display room in which controls and instruments are exhibited under actual operation. The room is arranged with individual panels that show under operation various Minneapolis-Honeywell electric controls, the company's new line of National pneumatic controls and its line of Brown Industrial instruments.

A MERRY CHRISTMAS ... and a HAPPY NEW YEAR!

YOU made 1937 one of the banner years of our existence. We've had a satisfying share of the heating and winter air conditioning business and like to feel that our equipment has contributed to a profitable year for yourself.

We suggest a resolution now to specify and install RYBOLT equipment on all your jobs in the coming year. You know from experience that RYBOLT returns good profits, gives excellent performance and has a greater number of satisfied customers so there's ample reason for such a resolution. Make your new year a happier one by tying in with RYBOLT.



The RYBOLT HEATER COMPANY, Ashland, Ohio

2400 SHEAR CUTS PER MINUTE

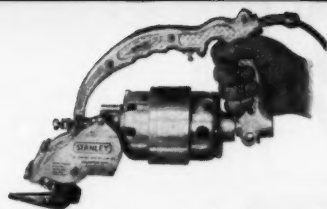
FASTER WORK

The cutting speed of a Stanley Unishear makes it possible to cut as fast as you feed, in the shop or on the job. A Unishear will do any job that snips will do, and do it so much faster that every hour you are without this tool actually costs you money.

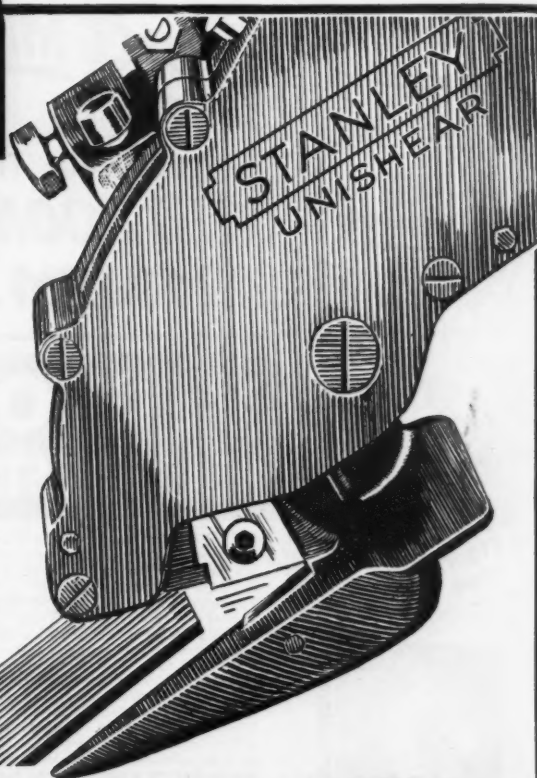
BETTER WORK

2400 shear cuts per minute means there is no distortion of metal — no burrs — no lost metal when you cut with a Unishear. Your cut is accurate to a straight line, curve, or angle. Edges are left smooth and finished.

Consider these two advantages and you will see why no progressive sheet metal shop can afford to be



without the proper Stanley Unishears for its work. "Mighty Midget", shown above, costs only \$61.00 — has capacity up to 18 gauge hot rolled steel. Other portable and stationary models cut up to 1/4" boiler plate. Your Stanley distributor will be glad to demonstrate a Unishear on your work. Or write for Catalog 64M. Stanley Electric Tool Division, The Stanley Works, New Britain, Conn.



STANLEY UNISHEARS THE ELECTRICALLY DRIVEN HAND SHEARS

THE EASY EDGER

A FLANGING MACHINE THAT FLANGES IN—

CAPACITY
20 GAUGE
AND LIGHTER

ONE
OPERATION

URNS
RIGHT ANGLE
FLANGES
ON
CURVED
STRAIGHT
OR
IRREGULAR
FITTINGS

FOR EVERY
SHEET METAL
HEATING
VENTILATING
AIR CONDITION-
ING SHOP

NOTE—WILL TURN ONE HEIGHT FLANGE ONLY (3/8)

MORE SIMPLE
THAN A
BURRING MACHINE

NO GAUGES
TO
ADJUST

SPEEDY
ACCURATE
UNIFORM EDGES

WRITE FOR DETAILS

WARD MACHINERY COMPANY

564 W. WASHINGTON BLVD.
CHICAGO ILLINOIS



FURNACE MEN!

HERE'S A
SURE CURE FOR THAT
**COLD ROOM
PROBLEM!**



VICTOR HEAT BOOSTERS

NOW'S the time to make those "Cold Rooms" pay you a handsome extra profit. Victor Heat Boosters are just what you need to do the job and do it quickly. It takes only 3 minutes to install a Victor Booster in either floor or wall type registers. Then, the powerful fan pulls out the cold air "cork" and the heat comes up in a hurry to make the room warm and cozy. A demonstration will sell anybody and, what's more, every installation leads to many new customers as each user likes to tell his friends about how he solved his "cold-room" problem. Remember, four out of five homes have at least one cold room, so get busy now and get your share of the extra profits that are waiting for the furnace men who sell Victor Heat Boosters. Ask your jobber or write us for complete details on prices and discounts, today!

VICTOR ELECTRIC PRODUCTS, INC.
708 Reading Road Cincinnati, Ohio

**Floor
Type \$7.50**

Wall \$10.00

With the Manufacturers . .

Somers Joins Lamneck

Lamneck Products, Inc., Columbus, Ohio, announces the appointment of W. Stuart Somers as chief engineer and manager of Research and New Products Division.

Bowman Represents Furblo

Furblo Company, Hermansville, Michigan, announces the appointment of H. C. Bowman as factory representative for the Cleveland area, at 4500 Euclid Avenue.

Armco Promotes Wilson

The American Rolling Mill Company, Middletown, Ohio, has named Murray B. Wilson, associated with Armco since 1923, manager of the New York sales district, according to H. M. Richards, manager of the sheet and strip sales division.

Sunbeam Wins Citation

In the "Third Annual Product Design Number" of the Electrical Manufacturing magazine, a Sunbeam air conditioning Unit, the Series No. 200, oil-fired air conditioning unit, manufactured by The Fox Furnace Company, Elyria, Ohio, won a Citation of Merit.

Proctor Assistant Manager

J. A. Proctor has been appointed assistant manager of the General Electric air conditioning department it has been announced by J. J. Donovan, manager. Mr. Proctor, who has been assistant to C. E. Wilson, G-E vice president, will make his headquarters at Bloomfield, N. J.

Premier Family Has Son

The Premium Furnace Company, Dowagiac, Michigan, announces an addition to the Premier family. A son was born to Mr. and Mrs. R. M. Judd on September 29. Dick Judd, Premier's president, is a mighty proud father and plans on introducing Richard Junior into air conditioning work just as soon as possible.

New Ohio Representative

The Ohio Electric Mfg. Co. of Cleveland, has recently appointed the following representatives for the sale of Ohio fractional size motors:

C. D. Blincoe, 2123 Trevillion Way, Louisville, Ky.
H. L. Prather, 2708 Essex St. S. E., Minneapolis, Minn.
Delavan Engineering Co., 414 Twelfth St., Des Moines, Iowa.

The company is now introducing a new line of stream-line A. C. motors with solid base—resilient mounted and belt tightener for under and over belt drives.

Fifteen New Coke Ovens

Calvin Verity, vice president of The American Rolling Mill Company, announces the construction of fifteen new coke ovens at an estimated cost of \$500,000 to be built at the company's blast furnaces in Hamilton, Ohio. The Koppers Company of Pittsburgh has the contract.

The new ovens, which will be erected on the north side of the present battery, will be of the Becker low differential, under-jet type. Each oven chamber holds fifteen tons of coal. The company already operates forty-five coke ovens.

The new ovens will make possible more economical operation of the company's two blast furnaces.

Annual Sales Meeting

The annual sales meeting of The Lincoln Electric Company, held recently at Cleveland, Ohio, was conducted in the company's new 200,000 sq. ft. factory addition which has a steel frame fabricated and erected entirely by electric welding. The new plant is the first in which a design featuring "tree-form" columns and an all welded rigid saw tooth frame has been used in its entirety.

The three-day sales meeting was under the direction of C. M. Taylor, vice president and sales manager.

MARSHALLTOWN THROATLESS SHEARS

Marshalltown shears are the choice of the field among men who know their sheet metal tools. They know that production costs go down and jobs are turned out faster and neater with a fast, self-feeding shear.

Marshalltown shears are built in various sizes to cut up to $\frac{1}{2}$ " plate any width, straight, circular or irregular. They may be had in either bench or floor types for hand or power operation. Also can be arranged for motor drive. Investigate the profit possibilities in Marshalltown shears. Write us today for new, free literature.



MARSHALLTOWN THROATLESS SHEAR CO.
920 EAST NEVADA ST.
MARSHALLTOWN IOWA



Great Power Slight Cost!

Famous Allen Multi-Vane Turbine Ventilators quickly and silently lift out bad air, fumes and dampness.

Three types of Allen Ventilators meet every requirement of your trade.—"Multi-Vane" for ordinary conditions, "Electro-Wind" for acute conditions, and "Type C" (vaneless) for the more inexpensive installations, and especially for chimney jobs. Our engineering department will aid you in making recommendations if desired.

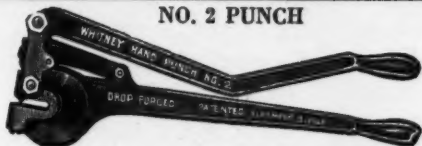
Literature on these three types of Allens should be in your files for reference. Please ask for it.

The ALLEN Corporation
9752 Erwin Avenue, Detroit, Mich.

ALLEN TURBINE
VENTILATORS

WHITNEY LEVER PUNCHES

NO. 2 PUNCH



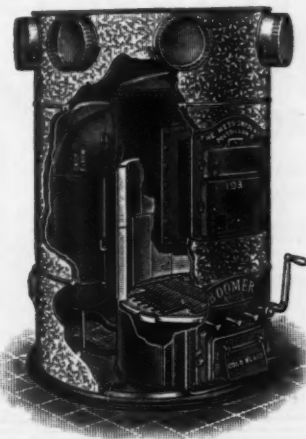
Length 23". Capacity $\frac{1}{8}$ " through $\frac{1}{4}$ " iron, weight 13 lbs., depth of throat $1\frac{1}{8}$ ". Punches and dies $\frac{3}{8}$ " to $\frac{1}{2}$ " by $\frac{3}{4}$ ".

No. 4-B PUNCH



This punch for sheet metal work has a capacity of $\frac{1}{4}$ -in. through 16 gauge. Weight 3 lb. Length $8\frac{1}{2}$ -in. Depth of throat 2-in. Complete tool includes three punches and three dies of specified sizes with die adjusting key.

W.A. WHITNEY MFG. CO.
636 RACE ST. ROCKFORD, ILL.



Boomer Boiler Plate Furnaces

Also made with duplex grates and upright shaker.

Have been successfully made for 23 years. Where introduced have given satisfactory service. The fire pot liners are the best we can buy and we know of several Boomers that still have the original liners in, which are 23 years old. We have been making cast iron Boomers for 50 years.

If you are interested in selling a strictly high grade furnace, ask for prices and agency.

Nothing but the best of material enters into the making of Boomers.

When repairs are needed, avoid risk of dissatisfaction by ordering direct from the original patterns. Prices are low.

We sell to legitimate dealers only.

THE HESS-SNYDER CO., MFRS.
Massillon, Ohio

Furnace Repair Parts

Write for Catalogue.

BANNER REPAIR PARTS CO.
YOUNGSTOWN, OHIO

Victor heating equipment is a line that enables you to buy all your requirements from one reliable source.



This Victor demonstrator enables Victor dealers to close sales at a profit. Investigate this money making line. Write or wire.

HALL-NEAL FURNACE CO., Indianapolis, Ind.

THE FIRES DON'T NEED TO BE OUT TO CLEAN WITH THIS MACHINE

**One Man Portable
Powerful—De Luxe**

Manual tells how to easily get cleaning orders that lead to other business.

Write for details.

Free Trial—Easy Payment
Plan.



Grand Rapids Furnace Cleaner Co.
225 Stevens St., S. W. Grand Rapids, Michigan



WISS
SCROLL-PIVOTER
SNIP

*Cuts rings around
other snips*

Cuts circles, scrolls
and squares as easily
as a straight line
will cut alloy steels.

Use Wiss Hy-power and Bulldog Snips

J. WISS & SONS CO.
Established 1848 Newark, N. J.

News Items

Bryans Represents Waterbury

R. L. Bryans, 600 Fourth Ave., NW., Minot, N. D., has been named representative and installer for Waterbury heating and air conditioning equipment.

Greenleaf—Consulting Engineer

Robert P. Greenleaf announces the establishment of an office for engineering consultation and design with special reference to air conditioning, located at 2804 East 132nd Street, Cleveland, Ohio.

Obituary

George Orlando Crouch, 76, organizer and president of G. O. Crouch and Son, Chattanooga, Tennessee, sheet metal work firm, died November 9 at his home, 1400 Bailey Avenue.

Louis D. Biersach

Louis D. Biersach, 92, president of the Biersach & Niedermeyer Co., sheet metal firm of 1937 North Hubbard Street, Milwaukee, Wisconsin, died recently at his home at 939 N. Tenth Street.

Mr. Biersach came from Germany 68 years ago and located in Chicago until the big fire, then moved to Milwaukee and worked on cornice and skylights which were sent to Chicago in carload lots. He established the Biersach & Niedermeyer Company in 1874. He made beer swimmers for Schlitz, Blatz and Pabst breweries. Some early sheet metal contracts were the Milwaukee water tower, Chicago, Milwaukee and St. Paul depot, Trinity Church, Wisconsin Trust Building, Wells Building and Pfister Hotel.

Surviving is his wife Minna whom he married in Milwaukee 62 years ago, three sons—Eugene, Rudolph and Hugo—and three daughters.

New Incorporations

The Portland Air Conditioning Corp. has been chartered at Portland, Ore., with capital stock of \$17,000. Incorporators are Lawrence E. French, Joe P. Price and Margaret French.

P. B. Little has engaged in the sheet metal and roofing business at 186 Minerva St., Jackson, Miss.

The D. F. Edwards Heating Company has been chartered in St. Louis, Missouri, by Daniel F. Edwards, of Millstadt, Illinois, and John T. Berger, of 208 North Broadway.

The Frank Carter Heating Company, Incorporated, has been chartered in St. Louis, Missouri, by Frank Carter and Benjamin A. Wood, 722 Chestnut Street.

The Greenfield Metal Corporation has been chartered in Los Angeles County, California, with a capital of \$25,000, by Aaron Greenfield, Ernest Rosenberg, B. Van Lane and P. Eisenshtot, all of Los Angeles.

The Russell Furnace Company, Incorporated, has been chartered in Spokane, Wash., with a capital of \$100,000, to handle heating systems, by Ross C., Addie and Wayne B. Russell.

The Reliance Equipment Company has been incorporated in Seattle, Washington, with a capital of \$1,000 to engage in furnace and equipment business, by Charles A. Dunham, L. W. Shank and H. W. Trueblood.

The Metal Products & Roofing Company has been chartered at 2935 West Greenfield Avenue, Milwaukee, Wisconsin, by Elibert B. Tonnsen, T. E. Tonnesen and Emil H. Wolfgram.



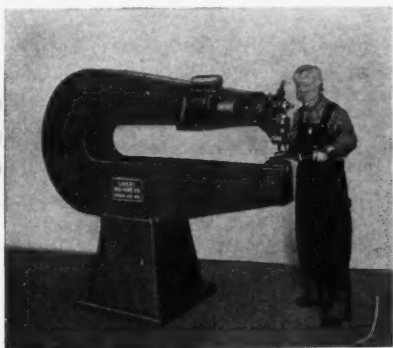
Radolite Asbestos Furnace Cement
Heat-Aid Furnace Lining
Radolite Refractory Cements
Pyrolite Heat Resisting Aluminum Paint
Pyrolite Heat Resisting Black Paint
Pyrolite Tinnings Red
Pyrolite Asbestos Roof Cement
Pyrolite Asbestos Fibre Roof Coating
Pyrolite Caulking Compound
Pyrolite Bronzing Liquid

THE PYROLITE PRODUCTS CO.

Refractory Engineers

1221-31 W. 74TH ST.

CLEVELAND, OHIO



ONE LIBERT SHEAR— Not Several Shears!

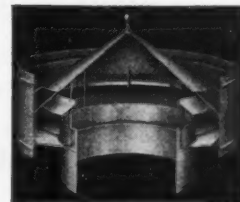
Meets all requirements for cutting IRREGULAR SHAPES—standard equipment furnished for ring and circle cutting . . . absolutely accurate and easily operated . . . metal is sheared and not punched . . . cut anywhere, no starting holes required for inside cutting . . . only one adjustment for various thickness of material used . . . unobstructed cutting vision . . . no further finishing required. No special cutters, pilots, templates, or strippers are needed . . . long life shear blades. Write for complete information.

LIBERT MACHINE CO. Green Bay, Wisconsin
Manufacturers of shears since 1915

Libert Method

BURT STANDARD GRAVITY VENTILATORS

FAST
SELLING



• The Burt Standard Gravity Ventilator is fast selling, a standard item that gives satisfactory service on any regular job. Re-designed, it affords even higher efficiency and greater value than ever before. Sturdy, efficient, it presents many attractive features that make good selling points . . . and the cost is most reasonable. Remember, Burt engineers help you specify and estimate.

Send for catalog.

THE BURT MFG. CO.

Roof Ventilators • Oil Filters

Exhaust Heads

300 MAIN STREET

AKRON, OHIO

PERFORATED METALS

Every Sheet Metal Worker needs perforated metal in one form or another.

For processing food products and to withstand certain chemicals, perforated Stainless Steel and Monel Metal are much used.

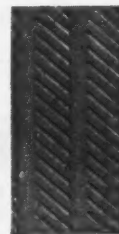
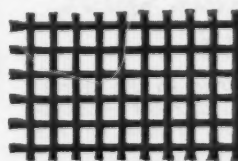
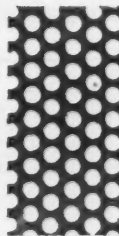
Factory Safety Guards—For this service perforated metal has no equal.

For Grilles, Radiator Enclosures, Air Conditioning Cabinets, we have many beautiful designs.

Write today for information and prices.

You'll like H&K prompt,
satisfying work and
pleasing prices.

Perforators of metals since 1883.
Send us your specifications.



The Harrington & King
PERFORATING CO.

5649 Fillmore St., Chicago, Ill. New York Office, 114 Liberty St.

PORTABLE SHEARS

ALL-ALLOY



ALL-ALLOY No. 2 cuts up to 1/4" steel plate.

ALL-ALLOY No. 1 cuts up to No. 11 gauge strip or sheet.

Special blades may be had for shearing stainless steel.

FULLY GUARANTEED

BREMIL MFG. CO. Erie, Pa.

How to Sell Furnaces and Repairs

WITH

The TORNADO Furnace Cleaner



The TORNADO gets you into the basement where it is easy to sell repairs and new furnaces. And you make a profit on the cleaning job too!

Dealers say that the TORNADO is the most powerful furnace cleaner built. Leads the field! Low price—easy payments—free trial. Approved by Anthracite Institute and Underwriters Lab. Thousands in use.

Write now for complete information.

Breuer Electric Mfg. Co.
865 Blackhawk Street, Chicago, Ill.

REPAIR PARTS?

... to fit every make and description of heating or cooking unit may be secured immediately upon order ... and you can bet that if it's the finest quality at a low price you are seeking ...

CAPITOL HAS IT!

**CAPITOL FURNACE AND
STOVE REPAIR CO.**

229 So. Meridian, Indianapolis, Ind.

ACME "Hot Spot" WELDERS

Universally accepted as the sturdiest, easiest handled, most economical electric Spot Welder on the market.

Write for literature and prices

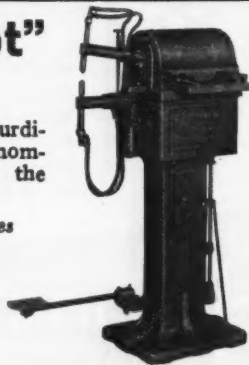
**Don't Rivet
SPOTWELD!
with an ACME**
Lifetime Guarantee!

Complete range of sizes

ACME ELECTRIC WELDER CO.

Warehouses in principal cities

5619 Pacific Blvd.



Huntington Park, Calif.
(Los Angeles County)

News Items

Rents New Quarters

Woodson-Bozeman, Inc., Memphis, Tenn., dealer in air conditioning and ventilating equipment, has made a long-term lease on the two-story brick building at 482-484 Union served by a spur track of the Southern Railway, and will move there after extensive remodeling is completed.

Gordon Erskine is president of the company; E. G. Woodson, vice president; E. D. Bozeman, treasurer, and George Humphreys, secretary.

Home Study Courses

The Massachusetts Department of Education—Adult Life Enrichment—announces home study courses in air conditioning and oil burner engineering. Bulletins describing more than two hundred correspondence courses in academic, commercial and industrial subjects may be secured from James G. Reardon, Commissioner, or James A. Moyer, Director, Division of University Extension, 217 State House, Boston.

Evening Tutorial Classes

The Department of University Extension, University of Toronto—the Provincial University of Ontario, Canada—lists "Air Conditioning" among the fifty or more subjects offered for the 1937-1938 school year. Information and application forms may be obtained from W. J. Dunlop, Director, University Extension, University of Toronto, Toronto 5, Ontario, Canada. B. W. Sharpe is Assistant Director.

Evening Courses in Air Conditioning

Columbia University, New York City—University Extension, Department of Architecture—announces evening courses in air conditioning. Instruction will be given by Robert W. Waterfill, director Buensod-Stacey Air Conditioning, Inc., and Claude A. Bulkeley, chief engineer, Niagara Blower Company.

Registration for the winter session began September 17 and for the spring session will begin January 31.

An outline of the course can be secured by writing the university.

Coming Conventions

1938

Jan. 19-20—Illinois Sheet Metal Contractors. Annual Convention. Peoria, Illinois.

Jan. 21-22—Sheet Metal and Warm Air Heating Contractors' Association of Indiana. Convention and Exhibit. LaSalle Hotel, South Bend, Indiana. Paul Jordan, Exec. Secretary, 631 S. Delaware, Indianapolis, Ind.

Jan. 24-26—National Warm Air Heating and Air Conditioning Association. Winter Convention. Roosevelt Hotel, New York City.

Feb. 7-9—Master Sheet Metal, Heating, Ventilating and Air Conditioning Contractors Association, Inc. of Wisconsin. 24th Annual. Republican Hotel, Milwaukee. Paul L. Biersach, secretary.

Mar. 1-3—Michigan Sheet Metal & Roofing Contractors' Assn. Annual Convention. Durant Hotel, Flint, Michigan.

Mar. 7-9—New York State Sheet Metal, Roofing & Air Conditioning Contractors' Association, Inc. Annual Convention. Buffalo, N. Y.

WHITNEY-JENSEN USEFUL HAND TOOLS

No. 5 Jr.
PUNCH



25,000 in use all over the world. Capacity $\frac{1}{4}$ " hole in 16 ga. iron. Weight only $2\frac{1}{2}$ lbs. Furnished complete in kit with 7 punches and dies in no-lose-out magazine.



7 Punches and dies included in kit.

SEE
OUR
EXHIBIT

at the New York Heat-
ing & Ventilating Show,
Jan. 24-28. Spaces
479-480.

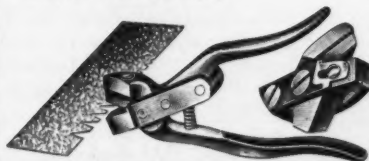
SEND FOR No. 11, showing the
OUR NEW complete Whitney-Jen-
CATALOG sen line of over 80 use-
ful metal-working tools.

Made in 3 handy sizes,
designed for the majority
of everyday punching work.
Will punch AND STRIP
inside 90°. Roller bearing
eccentric action insures long
life and accurate work.
Capacities, $\frac{1}{4}$ " hole through
 $\frac{1}{4}$ ", $\frac{3}{8}$ ", and $\frac{1}{2}$ " iron.

Nos. 7, $7\frac{1}{2}$, 8—Imperial
Roller Bearing PUNCHES



No. 41
HAND NOTCHER



For making notches of
any depth up to $\frac{1}{2}$ ".
Features include: full
opening in die and double-
duty depth gauge. Ca-
pacity, 20 ga. Weight
1 lb. Also the NEW
No. 41B Dovetail Notcher
for making lock joints.

WHITNEY METAL TOOL CO. • 91 Forbes Street, Rockford, Illinois

THERE IS A NEARBY SOURCE FOR CLINTON

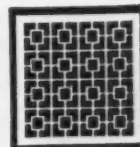
PERFORATED METAL

GRILLES



Local distribution is impor-
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sonally. If the local representative has not made
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will see that he calls. Clinton Grilles
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Shows Complete Line of "No-Streak" Reg-
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Also many helpful Charts, Tables, Estimating
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Rock Island Register Co.
Rock Island, Ill.

Please send me copy of your new catalogue.

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City

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NOW Burn-out-proof Fire-pots

Ask any homeowner, with a cracked fire-
pot, how he would like to have the next
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line job 9 times out of 10. Tell new fur-
nace buyers how Fireline not only saves
firepots, but saves fuel, increases heating
capacity, reduces smoke and soot, and
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This business is yours for the asking, extra
profits on every job, and a better furnace
for every customer.

Here is extra business
and extra profit on
every repair job or in-
stallation. Write for
full information and
FREE SAMPLE.



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SAVES YOU MONEY



Lyonore Metal saves repairs and maintenance costs by retarding the corrosion rat from gnawing in. Outlasts by years other sheet metals of comparable price. You save most when you get the best—insist upon Lyonore Metal for all sheet metal work. Send for details.

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Lyonore Metal

CHROMIUM • NICKEL • COPPER • IRON ALLOY

SALTS OR PASTE?

Either IF IT'S GOOD OLD
BURNLEY TRADE MARK



The Paste is ready to use—the Salts need a little water—you'll know how much for that's experience. Whichever you choose you can be sure that you have made a good choice. Write for sample—buy from your Jobber.



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Soldering Paste, Salts, Solution, Stick



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All that is best

in service, cuisine, atmosphere, and appointments is yours at The Biltmore—with a location in the very midst of the vital New York you wish to see. Single, \$6 up; double, \$8 up; suites, \$12 up.

THE BILTMORE

David B. Mulligan, President
Madison Avenue at 43rd Street, New York
Adjoining Grand Central

New Literature

For Literature, use the coupon on this page.

306—Equipment Catalog

Economy Electric Mfg. Co., 4634 W. 21st Place, Chicago, is distributing a catalog of their Economy heating, ventilating and air conditioning equipment.

307—Hand Lever Punches

W. A. Whitney Mfg. Co., Rockford, Illinois, is distributing a 40-page booklet illustrating and describing their hand lever punches.

308—Hammers, Mallets, Mauls

Chicago Rawhide Manufacturing Co., 1301 Elston Avenue, Chicago, is distributing a small folder illustrating and describing their rawhide hammers, mallets and mauls, with price list.

309—Blower Filter Unit

Schwitzer-Cummins Company, Fan Street, Indianapolis, Indiana, is distributing two folders illustrating and describing their Hy-Duty blower filter unit for warm air heating systems.

310—Electrodes for A-C Welding

Westinghouse Electric and Manufacturing Company, East Pittsburgh, Pa., has released a new publication with crucible weld electrodes for a-c welding as the subject. It describes three grades and sizes available and their application to all types of a-c welding.

311—Automatic Hot Water

Excelso Products Corporation, 1807 Elmwood Avenue, Buffalo, is distributing a 4-page folder describing the Leidig pre-heater, for use in stacks of boilers and furnaces that have high temperatures to furnish "Automatic Hot Water at No Fuel Cost."

312—Armco Research Souvenir

The American Rolling Mill Company, Middletown, Ohio, distributed a 16-page souvenir booklet at the dedication of their new research laboratory on November 5. The new laboratory is pictured on the front cover, underneath celluloid covers and the book is spirally bound.

313—Prefabricated Ducts and Fittings

The Williamson Heater Company, Cincinnati, Ohio, is distributing Catalog No. 123, illustrating and describing the Favorite simplified prefabricated ducts and fittings for forced air systems.

An engineering manual is also offered which presents a simplified method for short-cut figuring of winter air conditioning installations.

FOR YOUR CONVENIENCE

American Artisan, 6 N. Michigan Ave.,
Chicago, Ill.

Please ask the manufacturer to send me more information about the equipment mentioned under the following reference numbers in "New Products" and "New Literature." (Circle numbers in which you are interested):

192	193	194	195	196	197	198
199	200	201	202	203	204	205
206	207	208	209	210	211	
300	301	302	303	304	305	306
307	308	309	310	311	312	313

Name..... Title.....

Company.....

Address.....

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BOILER
FURNACE
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REPAIR PARTS
A.G. BRAUER
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316
N. THIRD
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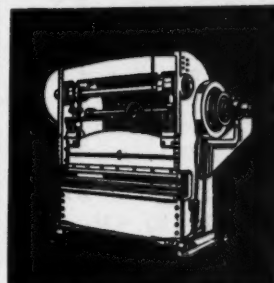
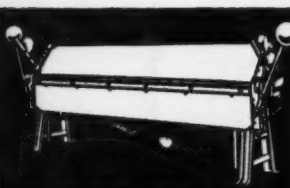
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Steel Brakes—Presses—Shears

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Certified STEELS



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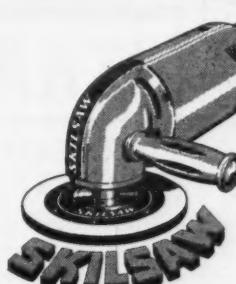
Sheets: Structural Angles, Tees, Zees, Galvanized Hoops, Bands, Copper Alloy Bars, Plates, Blue Annealed Tubing, Heavy Hot Rolled Bolts, Nuts, Welding Rod, Stainless, etc. etc.

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Ryerson Certified Steels represent the highest quality obtainable in each class and type of material. Stocks include more than 25 kinds of sheets and all other steel products for the sheet metal worker. Special quality and service features help users to secure best results. When you need good steel, a single bar or a carload, phone, wire or write the nearest Ryerson plant.

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TWO POWERFUL MODELS FOR HEAVY DUTY AND CONSTANT PRODUCTION SERVICE

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KEEP OLD MAN WINTER ON THE RUN

XXTH CENTURY HEATING & VENTILATING CO.
AKRON, OHIO

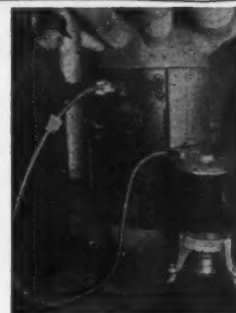
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DOUBLE SUCTION

WHY? Because it has more POWER. WORKS FASTER. Is BUILT TO LAST. Requires FEWER REPAIRS.

Send for complete information. Write today.



Double Suction Twice the Power One-Man Unit

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More Power to YOU
The Hold Heat Damper Motor is outstanding—for power and performance. A complete line of guaranteed, dependable controls for all domestic purposes. Write today for new control bulletin 837.
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BUTT • WIRE
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WELDERS**
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Submit Samples for Test. No Obligation
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use
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Welds 18 and 8 Stainless Sheets 22 gauge and heavier. Ideal for all fabrication requirements.
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are indispensable to the modern, up to date sheet metal shop. Light, portable, yet extremely strong, they will make your shearing operations much faster, neater and more economical thru time saved on the job. They are made in two sizes to handle up to 14 or 10 gauge metal and are very reasonably priced.

Write today for literature and prices.
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CEMENTS FOR EVERY HEATING PLANT PURPOSE

When ordering heat resisting materials for furnaces, stoves, or boilers, order "THARCO" Asbestos Furnace Cement, Asbestine Stove Putty, Asbestine Boiler Putty, Hi-Heat Putty, and Retort Cement. To be doubly sure of materials that will do every job perfectly, use "THARCO"

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This new edition provides all the information needed by the contractor to enable him to design and install any forced air heating system correctly. It includes a brand new data sheet and shows how to fill it in. It outlines step by step a design procedure which may be applied to any job, and contains all the charts, tables, diagrams and formulas necessary. Send \$2 for your copy today.

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Free AIR CONDITIONING AND REFRIGERATION TRIAL LESSON

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AT HOME IN SPARE TIME AT LOW COST
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Steel plate construction. Attachments for three different operations quickly changed. Write for literature on our complete line.

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Classified

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WANTED: Winter Air Conditioning and Furnace salesman, resident of Michigan to cover state. One of the oldest manufacturers who have complete lines of Winter Air Conditioning as well as furnaces and complete line of heating specialties desire only the best man in the territory. Replies confidential. Write Key No. 421, American Artisan, 6 N. Michigan Ave., Chicago.

SALESMAN WANTED: One of the largest and oldest manufacturers in the heating and air conditioning industry has openings for experienced, aggressive salesmen in the following territories: 1, Virginia and North Carolina; 2, Eastern New York, Western Massachusetts and Connecticut; 3, New York City, Long Island and Northern New Jersey; 4, New England states, except Western Massachusetts. Complete line of nationally advertised coal, oil and gas-fired equipment, also registers, grilles, furnaces pipe and fittings. Warehouse stocks adjacent to territories. Give complete information in first letter, including previous experience, sales record, references and acquaintance with heating trade. Include recent snap shot photo, if available. Address Key No. 422, American Artisan, 6 N. Michigan Ave., Chicago.

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POSITION WANTED by Sheet Metal worker. In business for self fifteen years. Experienced in laying out and installing forced air and air conditioning systems and general sheet metal work. Can give reference as to character and ability. Go anywhere for steady job. Address Key No. 420, American Artisan, 6 N. Michigan Ave., Chicago.

MISCELLANEOUS

WANTED: 12 foot, 16 gauge capacity Hand Bending, Brake. State make, age, condition and price. Address Patek Brothers, Inc., Milwaukee, Wis.

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OVER 2000 MACHINES IN STOCK !!

Announcing . .

**Our New
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covering everything in metal working machinery—listing many real bargains in our huge stock of more than 2000 machines of all makes, models, types and sizes.

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A POSITIVE SAFEGUARD AGAINST CHIMNEY DESTRUCTION

Prevents moisture-laden, acid-bearing corrosive gases from coming in contact with cold chimney walls.

Vitroliner is Vitreous enameled both inside and out; comes in all sizes, 3 to 10 inches diameter; Bell and Spigott type joints and can be made to fit any chimney. Specify Vitroliner on your next installation.

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the permanent Chimney Liner

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DEALERS SAVE MONEY by writing for Barclay's bargain catalog of all installation accessories and replacement parts for oil burners, stokers, forced air and automatic heating. 4 hour shipment. **ROBERT BARCLAY, INC.**, 128 N. Peoria Street, Chicago, Illinois.

RIBBED WIRE GLASS-13c per sq. ft.

STOCK SHEETS, CASE LOTS, PLUS BOXING F. O. B. BUFFALO, N. Y. SHIPMENT TO ANY PART OF THE UNITED STATES

QUOTATIONS ON ALL KINDS OF GLASS ON REQUEST

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For cutting in corners and difficult places and for making straight cuts. Announcing also The Junior Ralpo Cutter for No. 22 gauge and lighter. The No. 1 Ralpo Cutter for 16 ga. and lighter \$2.50. The No. 2 Junior Ralpo Cutter for No. 22 ga. and lighter, \$2.00. The No. 4 Ralpo Cor-Cut for No. 16 ga. and lighter, \$1.50. Remittance with order delivers any of these tools anywhere in the U. S. A., or ask your jobber.

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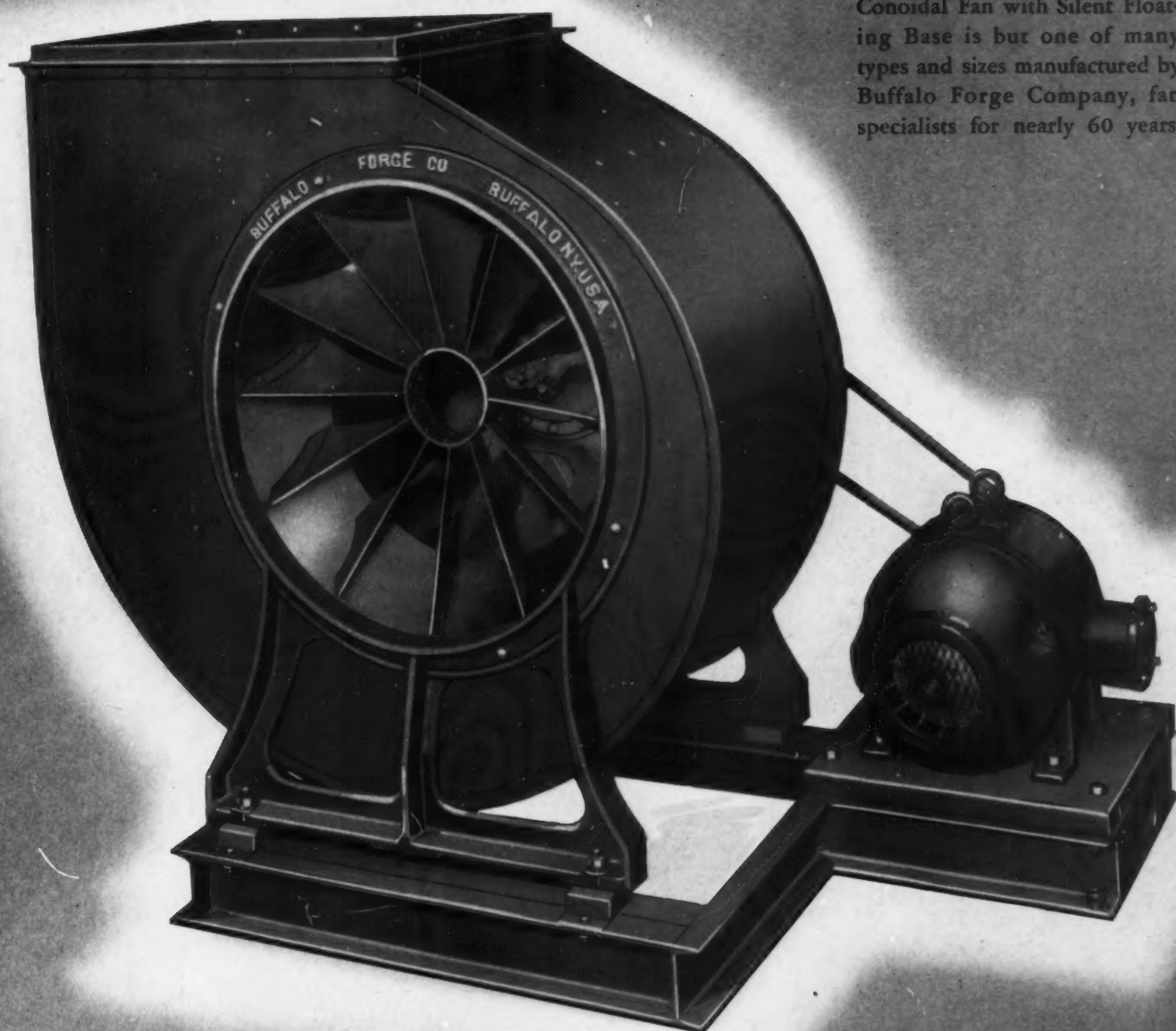
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This "Buffalo" Limit-Load Conoidal Fan with Silent Floating Base is but one of many types and sizes manufactured by Buffalo Forge Company, fan specialists for nearly 60 years.



THANK YOU! We appreciate the many opportunities you have afforded us during the year to work with you on your air handling problems . . .

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Branch Engineering Offices in Principal Cities

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Old Cap Carter

puts a steel mill to work

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In the lives of every one of us, steel plays a vital part. That fact is never for a moment forgotten at Youngstown, and research goes on continuously, to keep down the costs and increase the value of the countless steel products you use every day.

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Manufacturers of Carbon and Alloy Steels
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25-3A

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